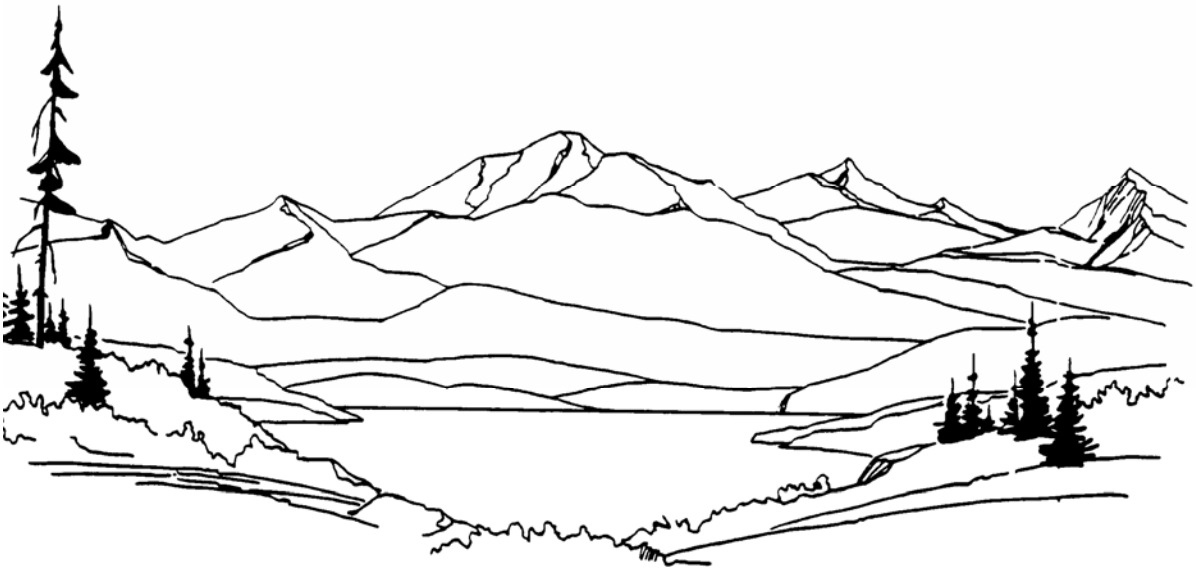
STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES

DIVISION OF PARKS
AND
OUTDOOR RECREATION



PROJECT MANUAL

DIVISION OF FORESTRY
REPLACE FORESTRY WELL HOUSE
COPPER CENTER
PROJECT NO. 34132-2

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STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES

INVITATION FOR BIDS

for Construction Contract

Date: **May 3, 2016**

Replace Forestry Well House-Copper Center, Project No. 34132-2

Project Name and Number

Location of Project: **Div. of Forestry Compound, Mile 110 Richardson Highway, Tazlina Alaska, 99588**

Contracting Officer: Rys Miranda, P.E., Procurement Officer

Issuing Office: Department of Natural Resources, Parks Design & Construction

State Funded ☒ Federal Aid ☐

Description of Work:

Replacement of an existing well house and water distribution system. Tie distribution system into two administrative buildings. Well house structure will have concrete footings, SIP construction, asphalt shingle roof and include all work described in the bid documents. Water distribution system will replace existing and tie into two buildings.

The Engineer's Estimate is:

- ☐ Less than $100,000
- ☒ Between $100,000 and $250,000
- ☐ Between $250,000 and $500,000
- ☐ Between $500,000 and $1,000,000
- ☐ Between $1,000,000 and $2,500,000
- ☐ Between $2,500,000 and $5,000,000
- ☐ Greater than $5,000,000

All work shall be completed by **August 30th, 2016**.

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, at 550 W. 7th Ave., Suite 1340; Anchorage, AK 99501 on the May 24, 2016.

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: **VCRA-Repair Well House, Project No. 34132-2**	**ATTN:** **Design & Construction Section** **Division of Parks & Outdoor Recreation** **550 W. 7th Ave., Suite 1380** **Anchorage AK 99501**

Bids, amendments or withdrawals transmitted by mail must be received at the above specified address no later than 30 minutes prior to the scheduled time of bid opening. Hand-delivered bids, amendments or withdrawals must be received at the above specified address prior to the scheduled time of bid opening. Faxed bid amendments must be addressed to the above specified address. Fax number: (907) 269-8917.

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 Department 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 SPECIAL NOTICE TO BIDDERS

Plans and Specifications may be downloaded from: http://dnr.alaska.gov/parks/designconstruct/bidcalresults.htm
For additional information contact:

Kathleen Raynor
550 W. 7th Ave., Suite 1380
Anchorage AK 99501
Phone: (907) 269-8731

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:

Luke Randall
Project Manager
Phone: (907) 269-8734 Email: luke.randall@alaska.gov

All questions concerning bidding procedures should be directed to:

Rys Miranda, P.E.
Chief, Design & Construction
550 W. 7th Ave., Suite 1340
Anchorage AK 99501
Phone: (907) 269-8736

Other Information:

Bid results are available approximately 30 minutes after each bid opening at
http://dnr.alaska.gov/parks/designconstruct/bidcalresults.htm

Alaska Department of Natural Resources

Contractor Self Certification for Subcontractors and Lower Tier Subcontractors (Form 25D-042)

Project Name: Replace Forestry Well House-Copper Center	
Project Number: **34132-2**	**Federal-Aid Number:**
Submission Number:	
Subcontractor or Lower Tier Subcontractor Name:	

Contractor Certification

Agreement as included herein refers to the legally binding written contract between the Contractor and Subcontractor or between the Subcontractor and Lower Tier Subcontractor and identified in items 1 or 2 below.

1. ☐ A written agreement has been executed between Contractor and the above listed subcontractor.
2. ☐ A written Agreement has been executed between (Subcontractor) and the above listed Lower Tier Subcontractor

- All Subcontractors are qualified to perform the work.
- All Subcontractors have adequate insurance as required by the Contract, or the Contractor has adequate insurance for the Subcontractor(s) as required by the contract.
- All subcontractors are included on the Bidder's Registration List.
- The "Prompt Payment" clauses (AS 36.90.210) are included in the Agreement language.
- All requirements and pertinent provisions of the Contract , including but not limited to; Form 25D-55, Required Contract Provisions for Federal Aid Construction Contracts, DBE provisions, and minimum wage rates, are included in the agreement.
- All agreements with Subcontractors and with Lower Tier Subcontractors will be in continued compliance with all provisions of the Contract.
- The Contractor remains responsible for all quality control and proper performance of all requirements of the Contract.
- The Contractor will continue to perform at least thirty percent (30%) of the Contract work with his own organization.
- This Contractor Self Certification does not relieve the Contractor and his surety, or either the Contractor or surety from any liability or responsibility under the Contract.
- The Contractor certifies firms or individuals debarred or suspended by the Department, FAA, or FHWA are not employed or subcontracted under this construction project.

Total Agreement Amount:

Total Agreement Amount is % of the Total Contract Award Amount.

Total cumulative subcontracts (including this Agreement) are % of the Total Contract Award Amount.

Subcontractor or Lower Tier Subcontractor

Federal I.D. No. (if no Federal I.D. No., use owner SSN):
Business License Number:
Contractor's License Number:
Electrical/Mechanical Administrator's License Number (if applicable):
Surveyor's License Number (if applicable):
Phone Number:
Address:
City: State:
Estimated Starting Date:

Department's Request for Information – If the Department at any time makes written request for the Agreement, licenses, proof of insurance, or any other information relating to the certifications contained herein, the Contractor will deliver an executed copy of the Agreement and /or other requested information to the Department within five calendar days. If the Contractor fails to provide the requested information within five calendar days, or if the Contractor fails to include required language and conditions in the Agreement, the Department may suspend all work relating to the Agreement. The Contractor shall not be due any additional compensation or contract time if the Department suspends work due to the Contractor's failure to provide requested information or failure to include required language and conditions in the Agreement.

False Statement or Omission – If a false statement or omission is made in connection with this Contractor Self Certification the Contractor will be excluded from participating in the self-certification process for the remainder of this Contract and for the following construction season. Contractors excluded from the self-certification process will be required to submit all necessary information for the Department's approval of proposed Subcontractors or Lower Tier Subcontractors.

Any false statement or omission made in connection with this Contractor Self Certification may be cause for suspension, a determination of non-responsibility on future bids, and may be cause for revocation of award, default, or debarment. The person or entity making the false statement or omission is subject to any and all civil and criminal penalties available pursuant to applicable state and federal law.

I certify the above information and statements are true, correct, and complete.

Contractor:

By: _____ **Date:**

Title:

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES

INFORMATION TO BIDDERS

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

EXAMINATION OF CONTRACT REQUIREMENTS

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

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

CONDITIONS AT SITE OF WORK

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

PREPARATION OF BIDS

(a) Bids shall be submitted on the forms furnished, and must be manually signed in ink. 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 State of Alaska. The amount of the bid security is specified on the Invitation To Bid.

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

If the bidder fails to furnish an acceptable bid security with the bid, the bid shall be rejected as 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 Department 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 Department to submit a statement of facts, in detail, as to his previous experience in performing comparable work, his business and technical organization, financial resources, and plant available to be used in performing the contemplated work.

SUBMISSION OF BIDS

Bids must be submitted as directed on the Invitation 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 Department to insure that Contractors receive all addenda when issued. Addenda will be issued to the individual or company to whom bidding documents were issued. Addenda may be issued by any reasonable method such as hand delivery, mail, telefacsimile, telegraph, 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.

WITHDRAWAL OR REVISION OF BIDS

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

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

RECEIPT AND OPENING OF BIDS

(a) The Department 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 Department prior to the time of the scheduled bid opening will not be considered.

(b) No responsibility will be attached to any officer or employee of the Department for the premature opening of, or failure to open, a bid improperly addressed or identified.

(c) The Department reserves the right to waive any technicality in bids received when such waiver is in the interest of the State.

BIDDERS PRESENT

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

BIDDERS INTERESTED IN MORE THAN ONE BID

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

REJECTION OF BIDS

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

AWARD OF CONTRACT

(a) The letter of award, if the contract is to be awarded, will be issued to the lowest responsible and responsive bidder as soon as practical and usually within 40 calendar days after opening of proposals.

(b) The successful bidder will be notified of the Department's intent to award the contract and requested to execute certain documents, including the contract form and bonds.

(c) The contract will be awarded to the successful bidder following receipt by the Department of all required documents, properly executed, within the time specified in the intent to award. Failure to enter into a contract within the specified time shall be grounds for forfeiture of the bid security and consideration of the second low bidder for award.

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES

SUPPLEMENTARY INFORMATION TO BIDDERS

This document modifies or adds to the provisions of Department of Natural Resources form 25D-3, INFORMATION TO BIDDERS.

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

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

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

"CONSIDERATION OF PROPOSALS

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

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

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

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

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

(1) cancel the Contract without any damages accruing to the State; or

(2) after notice and a hearing, assess a penalty on the Bidder in an amount that does not exceed 10 percent of the value of the Subcontract at issue.

A Bidder may replace a listed Subcontractor who:

(1) fails to comply with AS 08.18;

(2) files for bankruptcy or becomes insolvent;

(3) fails to execute a contract with the Bidder involving performance of the Work for which the Subcontractor was listed and the Bidder acted in good faith;

(4) fails to obtain bonding;

(5) fails to obtain insurance acceptable to the State;

(6) fails to perform the Contract with the Bidder involving Work for which the Subcontractor was listed;

(7) must be substituted in order for the prime CONTRACTOR to satisfy required State and Federal affirmative action requirements;

(8) refuses to agree or abide with the bidder's labor agreement; or

(9) is determined by the Contracting Officer to be 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 DEPARTMENT's intent to Award the Contract and the successful Bidder will be requested to execute certain documents, including the Contract form and bonds."

SECTION 00115

WORKER MEALS AND LODGING, OR PER DIEM

DESCRIPTION

The contractor is required to comply with the Alaska Department of Labor and Workforce Development (DOLWD) requirements for Worker Meals and Lodging, or Per Diem; as described in their September 1, 2009 memo WHPL #197(A3) and the State Laborer's and Mechanic's Minimum Rates of Pay (current issue).

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

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

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

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES

REQUIRED DOCUMENTS

State Funded Contracts

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-9DNR)**
2. **Bid Schedule**
3 **Bid Security (Form 25D-14DNR or Certified Check)**
4. Any bid revisions must be submitted by the bidder prior to bid opening on the following form:

   Bid Modification (Form 25D-16DNR)

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-5DNR)**

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-10ADNR)**
2. **Payment Bond (Form 25D-12DNR)**
3. **Performance Bond (Form 25D-13DNR)**
4. **Contractor's Questionnaire (Form 25D-8DNR)**
5. **Certificate of Insurance (from carrier)**

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES

PROPOSAL

for

Replace Forestry Well House-Copper Center, Project No. 34132-2
Project Name and Number

by

Company Name

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

TO THE CONTRACTING OFFICER,
DEPARTMENT OF NATURAL RESOURCES:

In compliance with your Invitation for Bids dated **May 3, 2016**, the Undersigned proposes to furnish and deliver all the materials and do all the work and labor required in the construction of the above-referenced Project, located at or near **Copper Center**, 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, which is made a part of this Bid.

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

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

The Undersigned agrees to commence the work after the effective date of the Notice to Proceed and after June 15, 2016, and to complete the work by **August 30, 2016**, 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).

Addenda Number	Date Issued	Addenda Number	Date Issued	Addenda Number	Date Issued

NON-COLLUSION DECLARATION

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 and hereby agrees to the conditions stated therein by affixing his signature below:

Signature of Authorized Company Representative

Typed Name and Title

( ) **( )**

Phone Number **Fax Number**

Email Address

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES

ALASKA PRODUCTS PREFERENCE WORKSHEET

(See Reverse Side for Instructions)

Project Name: Replace Forestry Well House-Copper Center
Project Number: 34132-2

Bid Phase:_____ Contractor:_____

PRODUCT	MANUFACTURER	CLASS & PREFERENCE PERCENTAGE	TOTAL DECLARED VALUE	REDUCTION AMOUNT

TOTAL _____

INSTRUCTIONS FOR ALASKA PRODUCTS PREFERENCE WORKSHEET

Special Note:

All procurements, except those funded from Federal sources, shall contain Contract provisions for the preference of Alaska products. The products listed by the Bidder or Proposer on this worksheet must have current certifications from the Alaska Products Preference program as of the date specified for bid opening or the proposal due date in order to be considered for the Alaska Products preference. A product with an expired Certification as of the date specified for bid opening or the proposal due date, will not be considered for the Alaska Products preference. In addition, and in accordance with the program, the products must be specified for use on the project. The listing of Certified Products is available from http://www.commerce.state.ak.us/oed/prodpref/prodpref.htm.

BIDDERS INSTRUCTIONS:

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

B. **Form Completion - BASIC BIDS.**

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

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

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

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

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

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

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

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

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

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

C. Forms Completion - ALTERNATE BIDS.

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

(2) On the first entry line enter "ADDITIONAL ALASKA PRODUCTS FOR ALTERNATE BID #_____", and repeat procedures 2 through 5 under part B of these Bidder's instructions except that references to "Basic Bid" shall be replaced with the words "Alternate Bid #_____."

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

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

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

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

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

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

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

SECTION 00312 - BID SCHEDULE

STATE OF ALASKA – DEPARTMENT OF NATURAL RESOURCES – DIVISION OF FORESTRY

Project Name: **Replace Forestry Well House-Copper Center**

Project Number: **34132-2**

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

The Bidder shall insert, as called for, a unit price or lump sum price in figures opposite each pay item for which an estimated quantity appears in the bid schedule. A unit price or lump sum price is not to be entered or tendered for any pay item not appearing in the bid schedule. The estimated quantity of work for payment on a lump sum basis will be "All Required" (All Req'd) and as further specified in the contract.

Whenever a Contingent Sum is shown for any item in this schedule, such amount shall govern and be included in the bid total.

Conditioned or qualified bids will be considered non-responsive.

The bidder shall insert a unit bid price for each pay item listed below. Type or print legibly.

Pay Item Number	Pay Item Description	Pay Unit	Quantity	Unit Bid Price	Amount Bid
******** BASIC BID with ALTERNATES ********					
1	Well House	L.S.	All Req'd	(Lump Sum)	$_____
a) TOTAL BASIC BID					$_____
b) ALASKA BIDDER PREFERENCE					-_____
c) ALASKA PRODUCTS PREFERENCE					-_____
d) AK VETERAN'S PREFERENCE					-_____
e) ADJUSTED BASIC BID AMOUNT					$_____

No:_____Expires_____ Alaska Business License

No:_____Expires_____ Alaska Contractor's License

Name of Bidding Firm_____

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES

BID BOND

For

Replace Forestry Well House-Copper Center, Project No. 34132-2
Project Name and Number

DATE BOND EXECUTED: _____

PRINCIPAL (Legal name and business address):	TYPE OF ORGANIZATION:
	[ ] Individual [ ] Partnership [ ] Joint Venture [ ] 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 for Bids therefor, 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.

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES

BID MODIFICATION

Replace Forestry Well House-Copper Center, Project No. 34132-2
Project Name and Number

Modification Number: _____

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

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

TOTAL REVISION: $_____

_____
Name of Bidding Firm

_____
Responsible Party Signature **Date**

This form may be duplicated if additional pages are needed.

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES

SUBCONTRACTOR LIST

Replace Forestry Well House-Copper Center, Project No. 34132-2
Project Name and Number

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

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

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

Check as applicable:

☐ All Work on the above-referenced project will by accomplished without subcontracts greater than ½ of 1% of the contract amount.

OR

☐ Subcontractor List is as follows:

LIST FIRST TIER SUBCONTRACTORS ONLY

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

CONTINUE SUBCONTRACTOR INFORMATION ON REVERSE SIDE

I hereby certify that the listed licenses and registrations were valid at the time bids were received for this project. For contracts involving Federal-aid funding, Alaska Business License and Contractor Registration will be required prior to award of subcontract.

Signature of Authorized Company Representative | **Title**

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

Date | **( ) Phone Number**

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

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES

CONSTRUCTION CONTRACT

Replace Forestry Well House-Copper Center, Project No. 34132-2
Project Name and Number

This CONTRACT, between the STATE OF ALASKA, DEPARTMENT OF NATURAL RESOURCES, herein called the Department, acting by and through its Contracting Officer, and

_____
Company Name

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

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

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

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

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

The Contractor further covenants and agrees that all materials shall be furnished and delivered and all labor shall be done and performed, in every respect, to the satisfaction of the Department, on or before: **August 30th, 2016**. It is expressly understood and agreed that in case of the failure on the part of the Contractor, for any reason, except with the written consent of the Department, to complete the furnishing and delivery of materials and the doing and performance of the work before the aforesaid date, the Department shall have the right to deduct from any money due or which may become due the Contractor, or if no money shall be due, the Department shall have the right to recover **Five Hundred and 00/100** dollars ($ **500.00**) per day for each calendar day elapsing between the time stipulated for the completion and the actual date of completion in accordance with the terms hereof; such deduction to be made, or sum to be recovered, not as a penalty but as liquidated damages.

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

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

CONTRACTOR

Company Name

Signature of Authorized Company Representative

Typed Name and Title

Date

(Corporate Seal)

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES

Forestry Duly Authorized Representative (Signature) **Date**

Typed Name

Signature of Contracting Officer **Date**

Typed Name

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES

PERFORMANCE BOND

Bond No. _____

For

Replace Forestry Well House-Copper Center, Project No. 34132-2
Project Name and Number

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 Department of Transportation and Public Facilities 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 Department of Natural Resources 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.

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES

PAYMENT BOND

Bond No. _____

For

Replace Forestry Well House-Copper Center, Project No. 34132-2
Project Name and Number

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-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 Department of Natural Resources 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.

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES

CONTRACTOR'S QUESTIONNAIRE

Replace Forestry Well House-Copper Center, Project No. 34132-2
Project Name and Number

A. FINANCIAL

1. Have you ever failed to complete a contract due to insufficient resources?

   ☐ NO ☐ YES If YES, explain:

   _____
   _____
   _____
   _____
   _____

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

B. EQUIPMENT

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

ITEM	QUAN.	MAKE	MODEL	SIZE / CAPACITY	PRESENT MARKET VALUE

2. What percent of the total value of this contract do you intend to subcontract? _____%

3. Do you propose to purchase any equipment for use on this project?

☐ NO ☐ YES If YES, describe type, quantity, and approximate cost:

4. Do you propose to rent any equipment for this work?

☐ NO ☐ YES If YES, describe type and quantity:

5. Is you bid based on firm offers for all material necessary for this project?

☐ NO ☐ YES If NO, explain:

C. EXPERIENCE

1. Have you had previous construction contracts or subcontracts with the State of Alaska?

☐ NO ☐ YES If YES, explain:

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 & Title of Person Signing**
Signature	**Date**

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
DOCUMENT 00700 - ISSUED DECEMBER 2011

GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT FOR BUILDINGS

ACKNOWLEDGMENT

"The State of Alaska, General Conditions of the Construction Contract for Buildings" is based on the "Standard General Conditions of the Construction Contract" as published by the National Society of Professional Engineers (document number 1910-8, 1983 edition) on behalf of the Engineers Joint Construction Documents Committee. Portions of the NSPE General Conditions are reprinted herein by the express permission of NSPE. Modifications to the NSPE text are made to provide for State laws, regulations, and established procedures.

The granting of permission by NSPE to allow the State of Alaska to preprint portions of the NSPE document 1910-8, 1983 edition does not constitute approval of the State of Alaska General Conditions of the Construction Contract for Buildinqs.

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 DEPARTMENT 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 DEPARTMENT 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 - 'Approved' or 'Approval' as used in this contract document shall mean that the Department has received a document, form or submittal from the contractor and that the Department has taken "No exceptions" to the item submitted. Unless the context clearly indicates otherwise, approved or approval shall not mean that the Department 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.

Architect - Where used in the contract documents, "ARCHITECT" shall mean the DEPARTMENT'S ENGINEER.

Architect/Engineer - Where used in the contract documents, "ARCHITECT/ENGINEER" shall mean the DEPARTMENT'S ENGINEER.

A.S - Initials which stand for Alaska Statute.

Award - The acceptance, by the DEPARTMENT, 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 DEPARTMENT directing changes to the Contract Documents, within their general scope.

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

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 DEPARTMENT 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 DEPARTMENT 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 Commissioner to enter into and administer the Contract on behalf of the DEPARTMENT. He 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, contracting with the DEPARTMENT for performance of the Work.

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

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.

DEPARTMENT - The Alaska Department of Transportation and Public Facilities. References to "Owner", "State", "Contracting Agency", mean the DEPARTMENT.

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 DEPARTMENT or the DEPARTMENT's Consultant and are by reference made a part of the Contract Documents.

ENGINEER - The DEPARTMENT'S authorized representative of the Contracting Officer, as defined in the DEPARTMENT'S *delegation of authority letter* to be issued after notice-to-proceed, who is responsible for administration of the contract.

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 Acceptance - The DEPARTMENT's written acceptance of the Work following Final Completion and the performance of all Contract requirements by the CONTRACTOR.

Final Completion - The Project (or specified part thereof) has progressed to the point that all required Work is complete as determined by the Contracting Officer.

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.

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

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 Engineer 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.

Laboratory - The official testing laboratories of the DEPARTMENT or such other laboratories as may be designated by the Engineer or identified in the contract documents.

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

Notice of Intent to Award - The written notice by the DEPARTMENT to all Bidders identifying the apparent successful Bidder and establishing the DEPARTMENT'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.

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.

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

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.

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

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 DEPARTMENT.

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 - The DEPARTMENT's 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, in the opinion of the Contracting Officer, as evidence by the DEPARTMENT's written notice, 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 DEPARTMENT 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, materialman or vendor of materials or equipment.

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

Traffic Control Plan (TCP) - A drawing of one or more specific plans that detail the routing of pedestrian, and/or vehicular traffic through or around a construction area.
Unit Price Work - Work to be paid for on the basis of unit prices.

Using Agency - The entitiy who will occupy or use the completed Project.

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 DEPARTMENT 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 DEPARTMENT 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 Should the Contracting Officer or his authorized representative designate Consultant(s) to act for the DEPARTMENT as provided for in Paragraph 2.1.1, the performance or nonperformance of the Consultant under such authority to act, shall not give rise to any contractual obligation or duty of the Consultant 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 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 DEPARTMENT 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 DEPARTMENT 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 DEPARTMENT shall furnish to the CONTRACTOR up to ten 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 DEPARTMENT 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 DEPARTMENT 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 DEPARTMENT or any of the DEPARTMENT'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 or 2.4.

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 DEPARTMENT 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 DEPARTMENT shall have or acquire any title to or ownership rights in any of the Contract Documents (or copies thereof) prepared by or for the DEPARTMENT 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 DEPARTMENT.

ARTICLE 4 - LANDS AND PHYSICAL CONDITIONS

4.1 Availability of Lands:

The DEPARTMENT 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 DEPARTMENT, 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 DEPARTMENT.

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 DEPARTMENT 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:

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 DEPARTMENT 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 Contracting Officer. 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 DEPARTMENT, 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 Contracting Officer. The Contracting Officer 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 DEPARTMENT 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 DEPARTMENT 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.

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:

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 DEPARTMENT (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 DEPARTMENT, or if any such Surety fails to furnish reports as to his financial condition as requested by the DEPARTMENT, the CONTRACTOR shall within five days thereafter substitute another bond and Surety, both of which must be acceptable to DEPARTMENT.

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

5.4.2 The CONTRACTOR shall maintain in force at all times during the performance of the work under this agreement the following policies and minimum limits of liability. Failure to maintain insurance may, at the option of the Contracting Officer, be deemed Defective Work and remedied in accordance with the Contract. 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 State 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. Comprehensive or Commercial General Liability Insurance: Such insurance shall cover all operations by or on behalf of the CONTRACTOR and provide insurance for bodily injury and property damage liability including coverage for:

premises and operations; products and completed operations; contractual liability insuring obligations assumed under paragraph 5.5, Indemnification; broad form property damage; and personal injury liability.

The minimum limits of liability shall be:

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
   $2,000,00 aggregate

2. If the CONTRATOR 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 State of Alaska, DEPARTMENT of Transportation and Public Facilities shall be named as an "Additional Insured" under all liability coverages listed above.

c. Automobile Liability Insurance:
Such insurance shall cover all owned, hired and non-owned vehicles and provide coverage not less than that of the Business Automobile Policy in limits not less than the following:

$1,000,000 each occurrence
(Combined Single Limit for bodily injury and property damage.)

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 DEPARTMENT, the CONTRACTOR and his Subcontractors. 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 and while temporarily located away from the Project site.

In addition to providing the above coverages the CONTRACTOR shall ensure that Subcontractors provide insurance coverages as noted in clauses a., b., and c. of this subparagraph. Builders Risk Insurance will only be required of subcontractors if so stated in the Supplementary Conditions.

e. Other Coverages:
As specified in the Supplementary Conditions.

5.4.3 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 State of Alaska and to add the State of Alaska as additional named indemnitee and as additional insured.

Evidence of insurance shall be furnished to the Department prior to the award of the contract. Such evidence, executed by the carrier's representative and issued to the Department, 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 Department of deficient evidence does not constitute a waiver of contract requirements.

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 DEPARTMENT, 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 construction or the CONTRACTOR's performance of this Contract; however, this provision has no effect if, but only if, the sole proximate cause of the injury or damage is the DEPARTMENT'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 Contracting Officer 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 DEPARTMENT. 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 Contracting Officer 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 Contracting Officer may, in writing, require the CONTRACTOR to remove from the Work any employee the Contracting Officer deems incompetent, careless, or otherwise detrimental to the progress of the Work, but the Contracting Officer 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 Contracting Officer, 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 DEPARTMENT or any of the DEPARTMENT'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 or 2.4.

6.6 Anticipated Schedules:

6.6.1 Within fourteen (14) calendar days after the date of the Notice to Proceed, the CONTRACTOR shall submit to the Contracting Officer for review an anticipated progress schedule indicating the starting and completion dates of the various stages of the Work. No individual stage of work shall exceed fourteen (14) calendar days.

6.6.2 Within twenty one (21) days after the date of the Notice to Proceed, the CONTRACTOR shall submit to the Contracting Officer for review an anticipated schedule of Shop Drawing submissions

6.6.3 Prior to submitting the CONTRACTOR's first Application for Payment, the CONTRACTOR shall submit for review and approval:

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 Contracting Officer and the CONTRACTOR will finalize schedules required by paragraph 6.6. The finalized progress schedule will be acceptable to the DEPARTMENT 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 DEPARTMENT 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 DEPARTMENT as providing a workable arrangement for processing the submissions. If accepted, the finalized Schedule of Values will be acknowledgment by the DEPARTMENT 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 DEPARTMENT 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 Contracting Officer 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 Contracting Officer 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 Contracting Officer only if sufficient information is submitted by the CONTRACTOR which clearly demonstrates to the Contracting Officer that the material or equipment proposed is equivalent or equal in all aspects to that named. The procedure for review by the Contracting Officer 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 Contracting Officer 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 Contracting Officer 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 DEPARTMENT 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 DEPARTMENT in evaluating the proposed substitute. The DEPARTMENT may require the CONTRACTOR to furnish at the CONTRACTOR's expense additional data about the proposed substitute. The Contracting Officer may reject any substitution request which the Contracting Officer determines is not in the best interest of the DEPARTMENT.

6.9.5 Substitutions shall be permitted during or after the bid period as allowed and in accordance with Document 00020 - Invitation for Bids, Document 00700 – General Conditions, and Document 01630 - Product Options and Substitutions.

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 Contracting Officer, if the CONTRACTOR submits sufficient information to allow the Contracting Officer to determine that the substitute proposed is equivalent to that indicated or required by the Contract Documents. The procedure for review by the Contracting Officer will be similar to that provided in paragraph 6.9 as applied by the Contracting Officer and as may be supplemented in the General Requirements.

6.11 Evaluation of Substitution:

The Contracting Officer will be allowed a reasonable time within which to evaluate each proposed substitute. The Contracting Officer 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 A.S. 36.90.210. Contracts between subcontractors, regardless of tier, must also contain these provisions. No acceptance by the Contracting Officer of any such Subcontractor shall constitute a waiver of any right of the DEPARTMENT to reject Defective Work.

6.13.2 The CONTRACTOR shall be fully responsible to the DEPARTMENT for all acts and omisions 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 DEPARTMENT 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 DEPARTMENT and any such Subcontractor, Supplier or other person or organization, nor shall it create any obligation on the part of the DEPARTMENT 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 DEPARTMENT 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 DEPARTMENT by any such owner or occupant because of the performance of the Work, the CONTRACTOR shall hold the DEPARTMENT 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 Contracting Officer for reference and copying. Upon completion of the Work, the annotated record documents, samples and Shop Drawings will be delivered to the Contracting Officer. 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 Contracting Officer.

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 DEPARTMENT, is obligated to act to prevent threatened damage, injury or loss. The CONTRACTOR shall give the Contracting Officer 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 DEPARTMENT 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 Contracting Officer.

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 Contracting Officer 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 Contracting Officer 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 Contracting Officer to review the information as required.

6.20.2 The CONTRACTOR shall also submit to the Contracting Officer 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 Contracting Officer 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 Contracting Officer 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 DEPARTMENT 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 DEPARTMENT of his intent. The DEPARTMENT may require the CONTRACTOR to furnish at the CONTRACTOR's expense additional data about the proposed variation. The Contracting Officer may reject any variation request which the Contracting Officer determines is not in the best interest of the DEPARTMENT.

6.21 Shop Drawing and Sample Review:

6.21.1 The Contracting Officer will review with reasonable promptness Shop Drawings and samples, but the Contracting Officer'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 Contracting Officer 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 Contracting Officer on previous submittals.

6.21.2 The Contracting Officer'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 Contracting Officer 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 DEPARTMENT shall be responsible for all DEPARTMENT review costs resulting from the initial submission and the fors resubmittal. The CONTRACTOR shall, at the discretion of the Contracting Agency, pay all review costs incurred by the DEPARTMENT 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 Contracting Officer'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 DEPARTMENT. 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 DEPARTMENT 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 DEPARTMENT 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 DEPARTMENT 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 DEPARTMENT 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 DEPARTMENT 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 DEPARTMENT, 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 DEPARTMENT 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 DEPARTMENT are at variance with any Regulatory Requirements, CONTRACTOR shall give the Contracting Officer 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 Contracting Officer. 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 Contracting Officer, the CONTRACTOR shall bear all costs arising therefrom; however, it shall not be the CONTRACTOR's primary responsibility to make certain that the Specifications and Drawings supplied by the DEPARTMENT 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 DEPARTMENT 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 venturers 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.l0.025 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 Contracting Officer. 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:

7.12.1 In determining the low bidder for State funded projects, a 5% bid preference has been given to "Alaska bidders", as required under AS 36.30.170. "Alaska bidder" means a person who:
(1) holds a current Alaska business license;
(2) submits a bid for goods, services, or construction under the name as appearing on the person's current Alaska business license
(3) has maintained a place of business within the state staffed by the bidder or an employee of the bidder for a period of six months immediately preceding the date of the bid;
(4) is incorporated or qualified to do business under the laws of the state, is a sole proprietorship, and the proprietor is a resident of the state or is a partnership, and all partners are residents of the state; and
(5) if a joint venture, is composed entirely of ventures that qualify under (1) through (4), above.

7.12.2 In determining the low bidder for State funded projects, an "Alaska products" preference has been given as required under AS 36.30.326 - 36.30.332, when the bidder designates the use of Alaska products. The Bidder shall complete the Alaska Products Preference Worksheet per its instructions and submit it with the Bid

Proposal. If the successful Bidder/CONTRACTOR proposes to use an Alaska product and does not do so, a penalty will be assessed against the successful Bidder/CONTRACTOR in an amount equal to the product preference percentage granted to the successful Bidder/CONTRACTOR plus one percent multiplied by the total declared value of the Alaska products proposed but not used.

7.12.3 Pursuant to AS 36.15.050 and AS 36.30.322, "agricultural/wood" products harvested in Alaska shall be used in State funded projects whenever they are priced no more than seven percent above agricultural/wood products harvested outside the state and are of a like quality as compared with agricultural/wood products harvested outside the state, when such products are not utilized, the CONTRACTOR shall document the efforts he made towards obtaining agricultural/wood products harvested in Alaska and include in this documentation a written statement that he contacted the manufacturers and suppliers identified on the Department of Commerce and Economic Development's list of suppliers of Alaska forest products concerning the availability of agricultural/wood products harvested in Alaska and, if available, the product prices. The CONTRACTOR's use of agricultural/wood products that fail to meet the requirements of this section shall be subject to the provisions of paragraphs 12.6 through 12.9 relating to Defective Work.

7.12.4 The CONTRACTOR shall maintain records, in a format acceptable to the Contracting Officer, which establish the type and extent of "agricultural/wood" and "Alaska" products utilized. All record keeping and documentation associated with the requirements 7.12.2 and 7.12.3 of this paragraph, must be provided to the DEPARTMENT upon written request or as otherwise provided within the Contract Documents.

7.13 Wages and Hours of Labor:

7.13.1 One certified copy of all payrolls shall be submitted weekly to the State Department of Labor and, upon request, to the Contrcting 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 with the Work he 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.

7.13.2 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 DEPARTMENT 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.

7.13.3 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 State 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.

7.14 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 DEPARTMENT 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.

ARTICLE 8 - OTHER WORK

8.1 Related Work at Site:

8.1.1 The DEPARTMENT 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 DEPARTMENT 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 Contracting Officer of such required increase within fifteen (15) calendar days following receipt of the Contracting Officer's notice. Should the Contracting Officer 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 DEPARTMENT (or the DEPARTMENT, if the DEPARTMENT is performing the additional work with the DEPARTMENT'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 Contracting Officer. 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 DEPARTMENT 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 DEPARTMENT, the CONTRACTOR shall inspect and promptly report to the Contracting Officer 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 nonapparent defects and deficiencies in the other work.

8.4 Coordination:

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

ARTICLE 9 - CHANGES

9.1 DEPARTMENT's Right to Change:

Without invalidating the Contract and without notice to any Surety, the DEPARTMENT 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 State-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 DEPARTMENT'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 Contracting Officer 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 Contracting Officer may order the Contractor to correct Defective Work or methods which are not in conformance with the Contract Documents.

9.3.4 The Contracting Officer 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 Contracting Officer, 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 Contracting Officer depicting such increases before proceeding with the Directive, except in the case of an emergency. If the Contracting Officer finds the increase in Contract Price or the extension of Contract Time justified, a Change Order will be issued. If however, the Contracting Officer does not find that a Change Order is justified, the Contracting Officer may direct the CONTRACTOR to proceed with the Work. The CONTRACTOR shall cooperate with the Contracting Officer 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 DEPARTMENT.

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 Contracting Officer, must be authorized by a Supplemental Agreement signed by the appropriate representatives of the DEPARTMENT 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 Contracting Officer 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 Contracting Officer shall promptly investigate the conditions, and if the Contracting Officer 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 adjustment shall be made and the Contract modified in writing accordingly. An adjustment in compensation shall be computed under Article 10.

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 Contracting Officer 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 l0 - CONTRACT PRICE; COMPUTATION AND CHANGE

l0.l 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.

l0.2 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 l5, and shall not be allowed unless notice requirements of this Contract have been met.

l0.3 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:

l0.3.l 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 l0.9.l through l0.9.3, inclusive).

l0.3.2 By mutual acceptance of a lump sum (fixed price) which includes overhead and profit. The lump sum (fixed price) shall be negotiated on the basis of the estimated "cost of the work" in accordance with Articles 10.4 and 10.5. 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. For costs incurred under paragraphs l0.4.l and l0.4.2, the CONTRACTOR's fee shall be twenty percent;

b. For costs incurred under paragraph l0.4.3, 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 for itself and all Subcontractors and multiple tiers thereof shall be fifteen percent of the cost incurred by the subcontractor actually performing the work;

c. No fee shall be payable on the basis of costs itemized under paragraphs l0.4.4, l0.4.5 and l0.5;

d. The amount of credit to be allowed by the CONTRACTOR to the DEPARTMENT 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 twenty 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 l0.3.2.a through l0.3.2.d, inclusive

l0.3.3 When 10.3.1 and 10.3.2 are inapplicable, on the basis of the "cost of the work" (determined as provided in paragraphs l0.4 and l0.5) plus a CONTRACTOR's fee for overhead and profit (determined as provided in paragraph l0.6).

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 DEPARTMENT, 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 DEPARTMENT 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 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 DEPARTMENT.

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 DEPARTMENT deposits funds with the CONTRACTOR with which to make payments, in which case the cash discounts shall accrue to the DEPARTMENT. All trade discounts, rebates and refunds and all returns from sale of surplus materials and equipment shall accrue to the DEPARTMENT, 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 DEPARTMENT, CONTRACTOR shall obtain competitive quotes from Subcontractors or Suppliers acceptable to the CONTRACTOR and shall deliver such quotes to the DEPARTMENT 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 DEPARTMENT 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 DEPARTMENT 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 DEPARTMENT. 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 DEPARTMENT in accordance with Article 5.

l0.5 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 and contracting 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 l0.4.l or specifically covered by paragraph l0.4.4 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 l0.4.5.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 l0.4.

l0.6 CONTRACTOR's Fee:

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

l0.6.l A mutually acceptable fixed fee; or if none can be agreed upon.

l0.6.2 A fee based on the following percentages of the various portions of the "cost of the work":

a. For costs incurred under paragraphs l0.4.l and l0.4.2, the CONTRACTOR's fee shall be fifteen percent;

b. For costs incurred under paragraph l0.4.3, 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 for itself and all Subcontractors and multiple tiers thereof shall be fifteen percent of the cost incurred by the subcontractor actually performing the work;

c. No fee shall be payable on the basis of costs itemized under paragraphs l0.4.4, l0.4.5 and l0.5;

d. The amount of credit to be allowed by the CONTRACTOR to the DEPARTMENT 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 fifteen 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 l0.6.2.a through l0.6.2.d, inclusive.

l0.7 Cost Breakdown:

Whenever the cost of any Work is to be determined pursuant to paragraphs l0.4 and l0.5, the CONTRACTOR will submit in a form acceptable to the DEPARTMENT an itemized cost breakdown together with supporting data.

l0.8 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:

l0.8.l 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

l0.8.2 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.

l0.9 Unit Price Work:

l0.9.l 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

DEPARTMENT 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 Contracting Officer will determine the actual quantities and classifications of Unit Price Work performed by the CONTRACTOR. The Contracting Officer will review with the CONTRACTOR preliminary determinations on such matters before finalizing the costs and quantities on the Schedule of Values. The Contracting Officer'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 Contracting Officer 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 Contracting Officer 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 Substantial Completion.

11.3.3 The Contract Time shall be as stated on form 25D-9, Proposal.

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 DEPARTMENT in its contractural capacity, acts of another contractor in the performance of a contract with the DEPARTMENT, 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 occurences 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 Contracting Officer 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 DEPARTMENT 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 DEPARTMENT 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 th Contract Documents, then the CONTRACTOR and his Surety shall be liable to the DEPARTMENT 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 DEPARTMENT will sustain by reason of delayed completion. These liquidated and actual damages are intended as compensation for losses anticipated to arise, and include 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 DEPARTMENT 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.

ARTICLE 12 - QUALITY ASSURANCE

12.1 Warranty and Guaranty:

The CONTRACTOR warrants and guarantees to the DEPARTMENT 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 DEPARTMENT and the DEPARTMENT's representatives, 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 Contracting Officer 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 therefor, pay all costs in connection therewith and furnish the Contracting Officer 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 DEPARTMENT'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 DEPARTMENT 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 Contracting Officer, it must, if requested by the Contracting Officer, be uncovered for observation. Such uncovering shall be at the CONTRACTOR's expense unless the CONTRACTOR has given the Contracting Officer timely notice of CONTRACTOR's intention to cover the same and the Contracting Officer has not acted with reasonable promptness in response to such notice.

12.3.5 Neither observations nor inspections, tests or Approvals by the DEPARTMENT 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 Contracting Officer, it must, if requested by the Contracting Officer, be uncovered for the Contracting Officer's observation and replaced at the CONTRACTOR's expense.

12.4.2 If the Contracting Officer considers it necessary or advisable that covered Work be observed inspected or tested, the CONTRACTOR, at the Contracting Officer's request, shall uncover, expose or otherwise make available for observation, inspection or testing as the Contracting Officer 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 DEPARTMENT 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 DEPARTMENT 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 Contracting Officer, 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 Contracting Officer, 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 DEPARTMENT and in accordance with the Contracting Officer's written instructions, either correct such Defective Work, or, if it has been rejected by the Contracting Officer, 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 DEPARTMENT 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 DEPARTMENT 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 Contracting Officer may accept Defective Work, the CONTRACTOR shall bear all direct, indirect and consequential costs attributable to the Contracting Officer'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 DEPARTMENT shall be entitled to an appropriate decrease in the Contract Price. If the DEPARTMENT has already made final payment to the CONTRACTOR, an appropriate amount shall be paid by the CONTRACTOR or his Surety to the DEPARTMENT.

12.9 DEPARTMENT May Correct Defective Work:

If the CONTRACTOR fails within a reasonable time after written notice from the Contracting Officer to proceed to correct Defective Work or to remove and replace rejected Work as required by the Contracting Officer 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 DEPARTMENT 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 DEPARTMENT shall proceed expeditiously. To the extent necessary to complete corrective and remedial action, the Contracting Officer 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 DEPARTMENT has paid the CONTRACTOR but which are stored elsewhere. The CONTRACTOR shall allow the Contracting Officer and his authorized representatives such access to the site as may be necessary to enable the Contracting Officer to exercise the rights and remedies under this paragraph. All direct, indirect and consequential costs of the DEPARTMENT 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 DEPARTMENT 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 Contracting Officer, of the DEPARTMENT'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 Contracting Officer. 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 Contracting Officer 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:

Contracting Officer will either indicate in writing a recommendation of payment or return the Application for Payment to the CONTRACTOR indicating in writing the Contracting Officer'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 DEPARTMENT 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 DEPARTMENT's interest therein, all of which will be satisfactory to the Contracting Officer. 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 DEPARTMENT 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 DEPARTMENT 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 DEPARTMENT has been required to correct Defective Work or complete Work in accordance with paragraph l2.9.

13.7.4 The DEPARTMENT's actual knowledge of the occurrence of any of the events enumerated in paragraphs l4.2.l.a through l4.2.1.k inclusive.

13.7.5 Claims have been made against the DEPARTMENT or against the funds held by the DEPARTMENT on account of the CONTRACTOR's actions or inactions in performing this Contract, or there are other items entitling the DEPARTMENT 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.l 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 DEPARTMENT 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 l0% of the total amount earned on all subsequent progress payments. This retainage may be released at such time as the Contracting Officer 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 DEPARTMENT, 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 DEPARTMENT 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 Contracting Officer 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 DEPARTMENT issue a certificate of Substantial Completion. Within a reasonable time thereafter, the Contracting Officer, the CONTRACTOR and appropriate Consultant(s) shall make an inspection of the Work to determine the status of completion. If the Contracting Officer does not consider the Work substantially complete, the Contracting Officer will notify the CONTRACTOR in writing giving the reasons therefor. If the Contracting Officer considers the Work substantially complete, the Contracting Officer 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 Contracting Officer 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 DEPARTMENT shall be responsible for all DEPARTMENT costs resulting from the initial inspection and the first re-inspection, the CONTRACTOR shall pay all costs incurred by the DEPARTMENT resulting from re-

inspections, thereafter.

13.11 Access Following Substantial Completion:

The DEPARTMENT shall have the right to exclude the CONTRACTOR from the Work after the date of Substantial Completion, but the DEPARTMENT 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 Contracting Officer will make a final inspection with the CONTRACTOR and appropriate Consultant(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 DEPARTMENT 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 Contracting Officer and delivered all 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 Contracting Officer 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 Contracting Officer's observation of the Work during construction and final inspection, and the Contracting Officer's review of the final Application for Payment and accompanying documentation - all as required by the Contract Documents; and the Contracting Officer is satisfied that the Work has been completed and the CONTRACTOR's other obligations under the Contract Documents have been fulfilled, the DEPARTMENT will process final Application for Payment. Otherwise, the Contracting Officer 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 Contracting Officer 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 DEPARTMENT 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.l, 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 DEPARTMENT 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 DEPARTMENT will issue a letter of Final Acceptance, releasing the CONTRACTOR from further obligations under the Contract, except as provided in paragraph 13.17.

13.16 CONTRACTOR's Continuing Obligation:

The CONTRACTOR's obligation to perform and complete the Work and pay all laborers, Subcontractors, and materialmen in accordance with the Contract Documents shall be absolute. Neither any progress or final payment by the DEPARTMENT, nor the issuance of a certificate of Substantial Completion, nor any use or occupancy of the Work or any part thereof by the DEPARTMENT or Using Agency, nor any act of acceptance by the DEPARTMENT 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 DEPARTMENT 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.

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) 01650, such Work shall constitute a continuing obligation under the Contract.

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 DEPARTMENT other than those previously made in writing and still unsettled.

13.18 No Waiver of Legal Rights:

The DEPARTMENT 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 therefor, 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 DEPARTMENT 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 DEPARTMENT, or any representative of the DEPARTMENT, 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 DEPARTMENT, 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 DEPARTMENT 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 DEPARTMENT May Suspend Work:

14.1.1 The DEPARTMENT 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 therefor 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 its 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 neglects or refuses 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 the CONTRACTOR declares bankruptcy, termination will be under Title 11 US Code 362 and/or 365. The CONTRACTOR'S 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. is a 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 DEPARTMENT 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 DEPARTMENT. The DEPARTMENT will provide the CONTRACTOR or its 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 its Surety, within the time specified in the above notice of default, shall not proceed in accordance therewith, then the DEPARTMENT 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 DEPARTMENT 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 DEPARTMENT has paid the CONTRACTOR but which are stored elsewhere, and finish the Work as the DEPARTMENT may deem expedient. The DEPARTMENT 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 its Surety or its 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 its 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 DEPARTMENT 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 DEPARTMENT 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 DEPARTMENT may transfer the obligation to perform the work from the CONTRACTOR to its surety. The surety must submit its plan for completion of the work, including any contracts or agreements with third parties for completion, to the DEPARTMENT 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 DEPARTMENT will make subsequent Contract payments directly to the Surety for work performed under the terms of the Contract. The CONTRACTOR shall forfeit any right to claim for the same work or any part thereof. The CONTRACTOR shall not be 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 DEPARTMENT 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 reprocurement 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 DEPARTMENT and any amounts due to persons for whose benefit the DEPARTMENT has withheld funds, such excess shall be paid by the DEPARTMENT to the CONTRACTOR. If the damages, costs, and expenses due the DEPARTMENT exceed the unpaid balance, the CONTRACTOR and its 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 DEPARTMENT, the termination will not affect any rights or remedies of the DEPARTMENT against the CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of moneys due the CONTRACTOR by the DEPARTMENT will not release the CONTRACTOR from liability.

14.4 Convenience Termination:

14.4.1 The performance of the Work may be terminated by the DEPARTMENT 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 DEPARTMENT. Any such termination shall be effected by delivery to the CONTRACTOR of a Notice of Termination, specifying termination is for the convenience of the DEPARTMENT 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 DEPARTMENT;

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 DEPARTMENT has or may acquire any interest.

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

14.4.3 When the DEPARTMENT 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 DEPARTMENT - 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 DEPARTMENT 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 DEPARTMENT. 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 the CONTRACTOR'S 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 the CONTRACTOR 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 the CONTRACTOR has 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 DEPARTMENT'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 DEPARTMENT 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 DEPARTMENT; 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 DEPARTMENT said termination shall not affect or terminate any of the rights of the DEPARTMENT 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 DEPARTMENT due to the CONTRACTOR under the terms of the Contract shall not release the CONTRACTOR or its 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 DEPARTMENT 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. Definitions. In this Subsection 108-1.09, the term "cost" and the term "expense" mean a monetary amount in U.S. Dollars actually incurred by the CONTRACTOR, actually reflected in its contemporaneously maintained accounting or other financial records and supported by original source documentation.

c. Cost Principles. The DEPARTMENT 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 FOR ADJUSTMENT AND DISPUTES

15.1 Notification

15.1.1 The CONTRACTOR shall notify the DEPARTMENT 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 DEPARTMENT 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 DEPARTMENT 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 DEPARTMENT 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 DEPARTMENT will not grant an extension of Contract Time if the CONTRACTOR does not timely submit revised schedules under **Section 01310**.

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 DEPARTMENT 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 DEPARTMENT access to any such records and furnish the DEPARTMENT 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 DEPARTMENT 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 DEPARTMENT.

15.1.5 If the claim or dispute is not resolved by the DEPARTMENT, 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 DEPARTMENT 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 DEPARTMENT'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 DEPARTMENT can make written request to the CONTRACTOR at any time for additional information relative to the Claim. The CONTRACTOR shall provide the DEPARTMENT 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

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 under AS 36.30.620. 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 Appeals Officer. Procedures for appeals are covered under AS 36.30.625 and AS 36.30.630.

15.5 Fraud and Misrepresentation in Making Claims

Criminal and Civil penalties authorized under AS 36.30.687 (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 DEPARTMENT at any stage of prosecuting a claim under this Contract.

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

The following supplements modify, change, delete from, or add to Section 00700 "General Conditions of the Construction Contract for Buildings", issued 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. **OWNER** – The State of Alaska.

2. **QUALITY ASSURANCE ACCEPTANCE TESTING –** This is all sampling and testing performed by the DEPARTMENT to determine at what level the product or service will be accepted for payment. Qualified personnel and laboratories will perform sampling and testing. The DEPARTMENT pays for this testing.

3. **QUALITY CONTROL PROGRAM (QC PROGRAM) –** The CONTRACTOR'S, Subcontractor's or Supplier's operational techniques and activities that maintain control of the manufacturing process to fulfill the Contract requirements. This may include materials handling, construction procedures, calibration and maintenance of equipment, production process control, material sampling, testing and inspection, and data analysis.

4. **RESIDENT ENGINEER -** The Engineer's authorized representative assigned to make detailed observations relating to contract performance.

B. Replace the first sentence of the definition for "DEPARTMENT" with "The Alaska Department of Natural Resources."

SC-2.4–VISITS TO SITE/PLACE OF BUSINESS

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

SC-4.3–EXPLORATIONS AND REPORTS

At General Conditions Article 4.3, add the following paragraph:

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

SC-5.4.2a – WORKERS COMPENSATION INSURANCE

At General Condition Article 5.4.2a, replace paragraph "a" in its entirety 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 State.

2. Employer's Liability Protection in the amount of $500,000 each accident / $500,000 each disease.

3. If the Contractor directly utilizes labor outside of the State of Alaska in the prosecution of the work, "Other States" endorsement shall be required as a condition of the contract.

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-6.9–SUBSTITUTES OR "OR-EQUAL" ITEMS

A. In Paragraph 6.9.5, Replace with "Substitutions will not be permitted".

SC-6.13–SUBCONTRACTORS

A. Add the following paragraph:

"6.13.7 The CONTRACTOR may, without penalty, replace a Subcontractor who:

1. Fails to comply with the licensing and registration requirements of AS 08.18;

2. Fails to obtain or maintain a valid Alaska Business License;

3. Files for bankruptcy or becomes insolvent;

4. Fails to execute a subcontract or performance of the work for which the Subcontractor was listed, and the CONTRACTOR has acted in good faith;

5. Fails to obtain bonding acceptable to the DEPARTMENT;

6. Fails to obtain insurance acceptable to the DEPARTMENT;

7. Fails to perform subcontract work for which the Subcontractor was listed;

8. Must be replaced to meet the CONTRACTOR'S required state or federal affirmative action requirements.

9. Refuses to agree to abide by the CONTRACTOR'S labor agreement; or

10. Is determined by the DEPARTMENT to be not responsible.

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

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

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

1. Cancel the Contract after Award without any damages accruing to the DEPARTMENT; or

2. After notice and hearing, assess a penalty on the bidder in an amount not exceeding 10 percent of the value of the subcontract at issue."

SC-6.28–REPAIR AND MAINTENANCE DURING CONSTRUCTION

Add the following article:

"6.28 Repair and Maintenance during Construction:

The CONTRACTOR shall repair the access roads and the related facilities located within the project limits from any damage caused by the CONTRACTOR'S or their Subcontractor's operations from the date construction begins until the Contractor receives a letter of Final Completion. The Contractor shall inspect these areas continually on a daily basis and maintain these areas effectively, with adequate resources to keep them in satisfactory condition at all times. The Contractor shall inspect and maintain those areas outside the project that are affected by the work, such as haul routes, detour routes, structures, material and disposal sites, and equipment storage sites during periods of their use.

The CONTRACTOR'S repair and maintenance does not replace the Using Agency's regularly scheduled repairs and maintenance inside the project limits. It only assists the Using Agency by providing additional repair and maintenance that may occur because of the increased traffic or damage from the CONTRACTOR'S operations.

The Engineer may relieve the Contractor of this repair and maintenance responsibility for specified portions of the project during a seasonal suspension of work.

The Contractor is not responsible for routine snow removal and ice control on the Access Road."

SC-7.2–PERMITS, LICENSES, AND TAXES

In Paragraph 7.2.1, replace this paragraph with the following paragraph:

"7.2.1 The terms, conditions, and stipulations in permits obtained either by the DEPARTMENT or by the CONTRACTOR are made part of this Contract.

a. Obtained Permits:

1. The DEPARTMENT has secured the following permits:

a. State of Alaska Department of Public Safety Division of Fire Prevention Full Plan Review Approval.

2. The DEPARTMENT will make these permits available upon request.

3. The DEPARTMENT will pay for and modify the above permit during the performance of the Contract, if deemed necessary by the Engineer.

b. The CONTRACTOR shall procure all other permits and licenses required to complete the project, pay all charges, fees and taxes, and give all notices necessary and incidental to the due and lawful prosecution of the Work.

c. 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 DEPARTMENT under this Contract."

SC-7.12 – APPLICABLE ALASKA PREFERENCES

A. Add the following paragraph:

"7.12.5 Alaska Veteran's Preference (AS 36.30.175). In determining the low bidder for State funded projects, a 5% bid preference has been given to a bidder who qualifies under AS 36.30.170(b) as an Alaska bidder and is a Qualifying Entity. This preference may not exceed $5,000.00. In this subsection a "Qualifying Entity" means a:

(1) Sole proprietorship owned by an Alaska Veteran;

(2) Partnership under AS 32.06 or AS 32.11 if a majority of the members are Alaska veterans;

(3) Limited liability company organized under AS 10.50 and if a majority of the members are Alaska veterans; or

(4) Corporation that is wholly owned by individuals and a majority of the individuals are Alaska veterans.

A preference under this section is in addition to any other preference for which the bidder qualifies. To qualify for this preference, the bidders must add value by the bidder actually performing, controlling, managing and supervising a significant part of the services provided or the bidder must have sold supplies or the general nature solicited to other state agencies, governments, or the general public. An Alaska veteran shall be a resident of this state and an individual who served in the Armed forces of the United

States, including a reserve unit of the United States armed forces; or Alaska Territorial Guard, the Alaska National Guard, or the Alaska Navel Militia; and was separated from service under a condition that was not dishonorable."

SC-9.4–CHANGE ORDER

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

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

SC-11.8–DELAY DAMAGES

At General Condition Article 11.8, add the following paragraphs:

"11.8.1 Failure to Meet Substantial Completion Date. For each calendar day that the work is not Substantially Complete after the expiration of the Contract Time or the Substantial Completion Date has passed, the DEPARTMENT shall deduct $500 from progress payments.

11.8.2 Failure to Meet Final Completion Date. For each calendar day that the work is substantially complete, but the project is not at Final Completion, after the Final Completion Date has passed, the DEPARTMENT shall deduct $500 (20 percent of the daily charge) from progress payments.

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

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

SC-12.1–WARRANTY AND GUARANTEE

At General Condition Article 12.1, add the following sentence:

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

SC-12.6–CORRECTION OR REMOVAL OF DEFECTIVE WORK

At General Condition Article 12.6, add the following paragraphs:

"The CONTRACTOR shall establish necessary lines and grades before performing the Work. Work done before necessary lines and grades are established, Work contrary to the DEPARTMENT'S instructions, Work done beyond the limits of the Contract, or any extra Work done without authority,

will be considered as unauthorized and shall not be paid for by the DEPARTMENT, and may be ordered removed or replaced at no additional cost to the DEPARTMENT."

SC-15.1–NOTIFICATION

A. In Paragraph 15.1.2, delete "under Section 01310"

END OF SECTION 00800

SECTION 00830 - 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 Department will include a paper copy of the State wage rates in the signed Contract.

END OF SECTION 00830

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SECTION 01010 - SUMMARY OF WORK

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

A. Section 00100 - Information Available to Bidders.

B. Section 00700 - General Conditions: Provisions for use of site, and Using Agency occupancy. Relations of Contractor - Subcontractors.

C. Section 00800 - Supplementary Conditions: Modifications to General Conditions.

D. Section 01400 - Quality Control

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Work covered by the contract documents is located at Division of Forestry's facility, in Glennallen, Alaska. The work consists of furnishing all labor, equipment, materials and supervision to complete demolition of existing structures and construction of facility improvements. The tasks required to complete this work include, but are not limited to, the following:

1. Demolition of existing well house and foundation;
2. Installation of new water distribution system;
3. Construction of the new well house;
4. Installation of all ancillary water system items;
5. the Contractor shall coordinate outages per Article 1.9 of this Section.

1.3 CONTRACT METHOD

A. Construct the Work under a single lump sum Contract.

1.4 BASIC BID

A. Construction Schedule:

1. The Department will not issue a Notice to Proceed for commencement of onsite work prior to June 1, 2016.
2. Final Inspection or Completion: On or before August 30, 2016.

B. Basic Bid Summary of Work: complete demolition of existing structures and construction of facility improvements. The Contract Drawings and Individual Specifications Sections describe the requirements and activities in detail.

C. The Engineer's Estimate for this project is between $100,000 and $250,000.

1.5 WORK BY OTHERS

A. The Contractor is hereby notified that there will be no other construction contracts underway on the site during the performance of this contract.

1.6 WORK INSIDE FACILITY

A. Work within the facility shall be conducted only between the hours of 7:00 AM and 7:00 PM seven days per week, unless specifically approved by the Engineer. Requests for work outside of these hours must be submitted in writing 24 hours in advance.

B. Contractor shall not under any circumstances leave tools or equipment unattended within the limits of the project site unless secured in a locked toolbox or equipment storage container. Contractor will be liable for any damages to persons and/or property resulting from unattended tools or equipment.

1.7 WORK PLANS AND ACCESS TO FACILITY, INDIVIDUAL WORK AREAS

A. In close coordination with the work schedule, provide detailed written (narrative) work plan with a sketch of each area impacted by the Contractor's work. The work plan shall be broken out into phases to localize impact of construction activities. Show limits of work enclosures, barricades, temporary partitions, or other items affecting the operation of the area.

B. Prior to beginning work in new phase of work identified in the work plan, the Contractor shall notify the Engineer in writing at least 5 (five) working days, not including weekends or Holidays.

C. No construction operations affecting safety or comfort of the public shall begin until the work area is closed off from the public.

D. It shall be the responsibility of the Contractor to coordinate all construction and haul activities through the Engineer and to comply with their instructions concerning the movements of construction equipment, men and materials in the vicinity of the project. All such requests shall be made at least 48 hours (excluding weekends) in advance of any planned closure or change.

E. All work shall be performed in a manner that will minimize disruption of on-going activities and operations in the existing facility during the course of the project. Demolition or any other work of a nature that could be hazardous or disruptive to activities shall be as approved by the Engineer.

F. Contractor staging area shall minimize interference with the Department’s use of the facility. Access shall be maintained for the Department, supply access, trash disposal, and vehicle access around the facility.

G. Contractor staging area to remain within the location designated by Engineer.

1.8 WORK COORDINATION REQUIREMENTS

A. Furnish all necessary equipment, services and personnel to perform the Work. Plan Work accordingly and coordinate all scheduled activities with the Engineer.

B. Coordinate schedules, submittals and Work of the Individual Specification Sections to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed by Department or under separate contracts.

C. Verify that characteristics of elements of interrelated operating equipment are compatible; coordinate work of Individual Specification Sections that have interdependent responsibilities for installing connection to, and placing such equipment in service.

D. Coordinate with Engineer to ensure that concealed Work is fully inspected and accepted before covering it up by further Work.

E. Coordinate completion and cleanup of Work of the Individual Specification Sections in preparation for Substantial Completion.

F. Whenever the Work of a Subcontractor is dependent upon the Work of other Subcontractors, contractors, or utility company contractors installing utilities under contract with the Department, then the Contractor shall require the Subcontractor to:

1. Coordinate its Work with the dependent work.
2. Provide dependent data and requirements.
3. Supply and install items to be built into dependent work of others.
4. Make provisions for dependent work of others.
5. Examine dependent drawings, specifications and submittals.
6. Examine previously placed dependent work.
7. Check and verify dependent dimensions of previously placed work.
8. Notify Contractor of previously placed dependent work or dependent dimensions, which are unsatisfactory or will prevent a satisfactory installation of its Work.
9. Not proceed with its Work until the unsatisfactory dependent conditions have been corrected.
10. Contractor shall require subcontractors to participate in coordination meetings as required by the Engineer.

1.9 COORDINATION WITH EXISTING FACILITIES AND UTILITIES

A. Utilities disruptions must be kept to an absolute minimum. All disruptions to services shall be coordinated with the Engineer and shall only be accepted if they occur in the off hours between 7:00 PM and 7:00 AM.

B. Arrange Work to avoid damage to the existing facilities and utilities and to avoid interference with Department operations during construction. The Contractor is solely liable for any damage caused by the interference of their operations with these facilities.

C. The Contract indicates various site utilities that may be within the project area and indicate whether they are to remain in service, be abandoned in place, and be adjusted by others or by the Contractor. The Department endeavor to have all necessary adjustments to be made by others completed as soon as practicable.

D. The location and elevation of existing utilities shown on the Plans are approximate only. Additional utilities may exist that are not shown on the Plans. Notify the Engineer of any discrepancies between the Drawings and actual field locations before construction.

E. The Contractor will locate the existing utilities and at points of possible conflict before starting construction. If necessary, the Contractor shall be responsible for uncovering the located utilities and protect them.

F. If conflicts occur or utilities are discovered that are not shown on the Drawings that require adjusting, the Engineer shall make Contract adjustments according with Section 00700 - General Conditions, Article 9. It is understood and agreed that the Contractor has considered in their bid all the permanent and temporary utility apprentices in their present and relocated positions as shown on the Plans, and the completion dates for various utility adjustments as may be stated in Section 00800 - Special Provisions, and at no additional compensation will be allowed for delays, inconvenience or damage sustained by the Contractor due to any interference from said utility appearances or the operation of moving them.

G. Immediately notify the Engineer of any utility interruption or damage. The Contractor shall repair at their own expense, any damage done by their personnel or Subcontractors to utilities and cables within the

Work area. Submit a written report describing the service type, interruption length, and repair method used.

1.10 CONTRACTOR'S USE OF PREMISES

A. Limit use of premises to that necessary for performance of the Work and for construction operations, to allow for continuous occupancy of the facility and grounds. Coordinate use of the premises under direction of Engineer.

B. Contractor is responsible for all safety considerations and precautions required during the construction period and to ensure all laws pertaining to workplace safety are followed.

C. Assume full responsibility for protection and safekeeping of products under this Contract.

D. Obtain and pay for use of additional storage or Work areas needed for operations under this Contract.

E. Do not stop or otherwise impede traffic without prior written approval from the Engineer. Provide traffic control layout plan and traffic control schedule upon request, unless Traffic Control is specifically required by another Section within this Contract, then provide as required in that Section.

1.11 COORDINATION

A. Coordinate Work of the various sections of Specifications to ensure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items installed later.

B. Verify if characteristics of elements of interrelated operating equipment are compatible; coordinate Work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

C. Coordinate space requirements and sequence of installation of electrical work, which is indicated diagrammatically on Drawings. Follow routing shown for conduits, as closely as practicable; make runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs. Coordinate work with existing elements in the building. Do not locate piping, conduit or other products where they will block access to equipment or junction boxes.

D. In finished areas except as otherwise shown, conceal pipes, ducts, and wiring in the construction.

1.13 OVERTIME WORK

A. The Contractor shall notify the Department at least 48 hours in advance of any overtime work, including nights, weekends, and holidays.

1.14 SURVEYING EXISTING CONDITIONS

A. Prior to commencing work, the Contractor and the Engineer shall jointly survey existing conditions. Before work begins, the Contractor and the Department shall both sign a Survey Record.

B. The Survey Record shall serve as a basis for determining any subsequent damage to existing facilities caused by the Contractor's work.

1.15 CONCEALED CONDITIONS UNACCEPTABLE TO CONTRACTOR

A. Should the Contractor discover conditions that are inconsistent with the Contract or existing construction of a substandard nature that will affect the satisfactory completion of the Work, proceed in accordance with the provisions in Section 00700-9.9, Differing Site Conditions and the Contractor must notify the Engineer immediately.

1.16 PROJECT COORDINATION PROCEDURE

A. Per Section 00700-2.1 Authorities and Limitations, only the Contracting Officer or his properly authorized agent has the authority to bind the Department. All other individuals have no authority to direct the work or make changes to the contract scope or contract time. Any reference to Architect, Engineer, Project Manager, or any other related title shall be as defined in Section 00700-1 Definitions.

1.17 SUPERINTENDENCE AND EMPLOYEES

A. Superintendence by the contractor shall be in accordance with Section 00700-6.2 Superintendence by Contractor. The Contractor's Superintendent shall be supported by competent assistants, as necessary; and the Superintendent and his assistants shall be satisfactory to the Department.

B. None of the Contractor's superintendents, supervisors, or engineers shall be withdrawn from the work without due notice being given to the Engineer; and no such withdrawal shall be made if it will jeopardize successful completion of the work.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not used

END OF SECTION 01010

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SECTION 01020 - INTENT OF DOCUMENTS

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

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

1.2 RELATED REQUIREMENTS

A. Section 00700 - General Conditions: Article 1 Definitions relating to 'Drawings' and 'Specifications'.

B. Section 00700 - General Conditions: Article 3 Contract Documents relating to Intent, Amending, and Reuse.

1.3 SPECIFICATION FORMAT AND COMPOSITION

A. Specifications are divided into Divisions and Sections for the convenience of writing and using. Titles are not intended to imply a particular trade jurisdiction or to imply a particular meaning or to fully describe the Work of each Division or Section, and are not an integral part of the text which specifies the requirements. DEPARTMENT is not bound to define the limits of any subcontract, and will not enter into disputes between the Contractor and his employees, including Subcontractors.

B. Pages are numbered independently for each Section, and recorded in the Table of Contents. Section number is shown with the page number at the bottom of each page. The end of each Section of the specifications is ended by "End of Section". It is Contractor's responsibility to verify that Contract Documents received for bidding and/or construction are complete in accordance with Table of Contents.

C. The language employed in the Contract Documents is addressed directly to the Contractor. Imperative or indicative language is generally employed throughout and requirements expressed are the mandatory responsibility of the Contractor, even though the work specified may be accomplished by specialty subcontractors engaged by the Contractor. References to third parties in this regard shall not be interpreted in any way as to relieve the Contractor of his or her responsibility under this Contract.

D. These Specifications are of the abbreviated, or "streamlined" type, and may include incomplete sentences.

E. Omissions of words or phrases such as "the Contractor shall", "in conformity therewith", "shall be", "as noted on the Drawings", "according to the Drawings", "a", "an", "the" and "all" are intentional.

F. Omitted words or phrases shall be supplied by inference in the same manner as they are when a "note" occurs on the Drawings.

1.4 DRAWINGS: CONTENT EXPLANATION

A. Drawings, Dimensions and Measurements.

1. Contract Documents do not purport to describe in detail, absolute and complete construction information. In some instances drawings are diagrammatic. Contractor shall provide verification of actual site conditions and shall provide complete and operational systems as specified when drawings do not provide full detail.
2. Where on any of the Drawings a portion of the work is drawn out and the remainder is indicated in outline, the parts drawn out shall apply also to all other portions of the Work.

3. Wherever a detail is referenced and developed for a specific condition, same or similar detail shall apply to identical or similar conditions elsewhere on Project even though not specifically referenced.
4. Where the word "similar" occurs on the Drawings, it shall be interpreted in its general sense and not as meaning identical, all details shall be worked out in relation to their location and their connection with other parts of the work.
5. The figured dimensions on the Drawings or notes indicating dimensions shall be used instead of measurements of the Drawings by scale.
6. No scale measurements shall be used as a dimension to work with unless specific permission to do so is granted in advance in writing by the Engineer.

1.5 COMMON TERMINOLOGY

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

1.6 CONFLICTS

A. Report any conflicts to the Engineer for clarification.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01020

SECTION 01027 - APPLICATIONS FOR PAYMENT

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

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

1.2 RELATED REQUIREMENTS

A. Section 00510 - Construction Contract - Contract Form 25D-10a and Bid Schedule: Method of Payment and Contract Price and Amounts of Liquidated Damages.

B. Section 00700 - General Conditions: Progress Payments, and Final Payment.

C. Section 01300 - Submittals: Procedures.

D. Section 01700 - Contract Closeout: Closeout Procedures.

1.3 FORMAT

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

1.4 PREPARATION OF APPLICATIONS

A. Type required information on Application for Payment form approved by the Engineer.

B. Execute certification by original signature of authorized officer upon the Application for Payment.

C. Submit names of individuals authorized to be responsible for information submitted on application for payment.

D. Indicate breakdown of costs for each item of the Work on accepted Schedule of Values. Provide dollar value in each column for each line item for portion of Work performed and for stored products.

E. List each authorized Change Order as an extension on continuation sheet, listing Change Order number and dollar amount as for an original item of Work.

F. Prepare Application for Final Payment as specified in Section 01700.

1.5 SUBMITTAL PROCEDURES

A. Submit one copy of each Application for Payment at times stipulated in Contract.

B. Submit under transmittal letter specified in Section 01300.

1.6 SUBSTANTIATING DATA

A. When Engineer requires substantiating information, submit data justifying line item amounts in question.

B. Substantiating data required under General Conditions Articles 7.12.3 and 7.12.4 shall be submitted (or updated) when the Application for Payment includes a current request for payment on an item of Work required to include Alaska "agricultural/wood" products.

C. Provide one copy of data with cover letter for each copy of Application. Show Application number and date, and line item by number and description.

1.7 SUBMITTALS WITH APPLICATION FOR PAYMENT

A. Submit the following with each Application for Payment.

1. Updated construction schedule as required by Section 01300 - Submittals.
2. Updated Schedule of Values as required by Section 01300 - Submittals: Schedule of Values.
3. The Contractor’s as-builts will be reviewed prior to approving each application for payment.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01027

SECTION 01028 - CHANGE ORDER PROCEDURES

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

A. Procedures for processing Change Orders.

1.2 RELATED REQUIREMENTS

A. Section 00312 - Bid Schedule: Total amount bid for lump sum items.

B. Section 00510 - Contract Form: Total amount of Contract Price, as awarded.

C. Section 00700 - General Conditions: Governing requirements for changes in the Work, in Contract Price, and Contract Time.

D. Section 00800 - Supplementary Conditions: Modifications to Document 00700 - General Conditions.

E. Section 01027 - Applications for Payment.

F. Section 01300 - Submittals: Construction Progress Schedules, Schedule of Values.

G. Section 01600 - Material and Equipment: Product Options, Substitutions.

H. Section 01700 - Contract Closeout: Project Record Documents.

1.3 SUBMITTALS

A. Submit name of the individual authorized to accept changes, and to be responsible for informing others in Contractor's employ of changes in the Work.

B. Change Order Forms will be prepared by the Department.

1.4 DOCUMENTATION OF CHANGE IN CONTRACT PRICE AND CONTRACT TIME

A. Maintain detailed records of work done on a Cost of the Work plus a Fee basis. Provide full information required for evaluation of proposed changes, and to substantiate costs of changes in the Work. Incomplete or unsubstantiated costs will be disallowed.

B. Contractor shall submit a complete, detailed, itemized cost breakdown addressing impact on Contract Time and Contract Price with each proposal.

C. On request, provide additional data to support computations:

1. Quantities of products, labor, and equipment.
2. Taxes, insurance and bonds.
3. Overhead and profit.
4. Justification for any change in Contract Time.
5. Credit for deletions from Contract, similarly documented.

D. Support each claim for additional costs, and for work done on a cost of the Work plus a Fee basis, with additional information:

1. Origin and date of claim.
2. Dates and times work was performed, and by whom.
3. Time records and wage rates paid.
4. Invoices and receipts for products, equipment, and subcontracts, similarly documented.

1.5 PRELIMINARY PROCEDURES

A. Engineer may submit a Proposal Request which includes: Detailed description of change with supplementary or revised Drawings and Specifications, the projected time for executing the change, with a stipulation of any overtime work required, and the period of time during which the requested price will be considered valid.

B. Contractor may initiate a change by submittal of a request to Engineer describing the proposed change with a statement of the reason for the change, and the effect on Contract Price and Contract Time, with full documentation. Document any requested substitutions in accordance with Section 01600.

1.6 CONSTRUCTION CHANGE AUTHORIZATION

A. Shall be in accordance with Article 9 - Changes, in Section 00700 - General Conditions, as modified by the Supplementary Conditions.

1.7 FIXED PRICE CHANGE ORDER

A. Contractor shall submit an itemized price proposal in sufficient detail to fully explain the basis for the proposal. Attach invoices and receipts for products, equipment, and subcontracts, as requested by the Department. Contractor and the Engineer shall then negotiate an equitable price (and time adjustment if appropriate) in good faith. The Change Order will reflect the results of those negotiations. If negotiations break down, Contractor may be directed to perform the work under COST OF THE WORK CHANGE ORDER.

B. The following maximum rates of cost markup (to cover both overhead and profit of the Contractor) shall be used in the negotiation of a “Fixed-Price” Change Order:

1. See Section 00700-10.3.2.

C. These terms shall also apply to the proposals of subcontractors and allowances.

D. Will be based on proposal request and Contractor's lump sum quotation or Contractor's request for Change Order as approved by the Department.

1.8 UNIT PRICE CHANGE ORDER

A. For pre-determined Unit Prices and quantities, Change Order will be executed on a lump sum basis.

B. For pre-determined Unit Prices and undetermined quantities, Change Order will be executed on an estimated quantity basis; payment will be based on actual quantities measured as specified.

C. For unit costs or quantities of units of Work which are not predetermined, execute Work under a Directive. Changes in Contract Price or Contract Time will be computed as specified for Cost of the Work Change Order.

1.9 COST OF THE WORK CHANGE ORDER

A. Contractor shall submit documentation required in Article 1.04 on a daily basis for certification by the Engineer. Engineer will indicate by signature that the submitted documentation is acceptable.

B. After completion of the change and within 14 calendar days, unless extended by the Engineer, the Contractor shall submit in final form an itemized account, with supporting data, of all costs. Supporting data shall have been certified by the Engineer, as required above in paragraph A.

1.10 EXECUTION OF CHANGE ORDERS

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

1.11 CORRELATION OF CONTRACTOR SUBMITTALS

A. Promptly revise Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Price as shown on Change Order.

B. Promptly revise Progress Schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of Work affected by the change, and resubmit.

C. Promptly enter changes in Project Record Documents.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01028

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SECTION 01126 - CONTRACTOR'S CERTIFICATION OF SUBCONTRACTS

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

A. Procedures for preparing, submitting and accepting subcontracts.

1.2 RELATED REQUIREMENTS

A. Document 00101 - Supplementary Information to Bidders

B. Document 00430 - Subcontractor List

C. Section 00700 - General Conditions: Paragraph 6.13.1, Subcontractor Certification and Approval

D. Section 00700 - General Conditions: Paragraph 6.13.4, Subcontractor Certification and Approval

E. Section 00920 - General Conditions: Paragraph 2.7.3.1, Subcontractors

F. Section 01300 - Submittals: Submittal Procedures

1.3 PREPARATION OF CERTIFICATION

A. Certification Forms: Use forms provided by Engineer.

B. Substitute certification forms will not be considered.

C. CONTRACTOR to prepare certification form and submit to the Engineer for approval prior to the subcontractor's start of work. Where required, attach additional information to the certification form.

1.4 SUBMITTAL OF CERTIFICATION

A. Contractor shall submit the initial and all subsequent certification form(s) in accordance with the submittal requirements identified under Paragraph 1.2.D, previous.

B. Contractor shall submit a certification for all subcontractors regardless of the subcontract amount or the tier of the subcontractor.

1.5 CONSIDERATION OF CERTIFICATION

A. Following receipt of submittal and within a reasonable period of time, the Engineer shall review for each of the following:

1. Completeness of forms and attachments
2. Proper execution (signatures) of forms and attachments
3. Contractor restrictions for adding subcontractors, changing subcontractors, and value of contract.

B. Submittals which are not complete or not properly executed will be returned to the Contractor under a transmittal letter denoting the deficiencies found. Contractor shall correct and resubmit per Paragraph 1.4, previous.

C. Subcontractors which have not been approved by the Engineer shall not be allowed on site.

D. The Engineer will not process payments for work performed by a non-certified subcontractor.

1.6 ACKNOWLEDGEMENT OF CERTIFICATION

A. Submittals examined by the Engineer and determined to be complete and properly executed shall be acknowledged as such by the Engineer on the approval line of the certification form and returned to the Contractor.

1.7 CHANGES TO APPROVED SUBCONTRACTORS LIST

A. Deletion or replacement of subcontractors listed on approved form 25D-5, or the addition of subcontractors not listed on approved form 25D-5 shall be in accordance with Section 00800 Supplementary Conditions, Paragraph SC-6.13.7 and AS 36.30.115.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01126

SECTION 01200 - PROJECT MEETINGS

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

A. Contractor participation in preconstruction conferences.

B. Contractor administration of progress meetings and pre-installation conferences.

1.2 RELATED REQUIREMENTS

A. Section 01010 - Summary of Work: Coordination.

B. Section 01300 - Submittals: Construction Progress Schedules, Shop drawings, Product data, and Samples.

C. Section 01400 - Quality Control.

D. Section 01700 - Contract Closeout: Project Record Documents, Operation and Maintenance Data.

1.3 PRECONSTRUCTION CONFERENCES

A. Subsequent to Award and prior to the beginning of on-site work, the Department will convene a meeting of the parties to the contract. The purpose of this meeting is to initiate personal contact among the Parties' representatives and establish administrative and coordination procedures. Other items of interest may be raised at this meeting. The time of the meeting will be mutually agreed upon by the parties after award of Contract.

B. Department will administer preconstruction conference for execution of Contract and exchange of preliminary submittals and review of administrative procedures.

C. Department will administer site mobilization conference at Project site for clarification of Contractor responsibilities in use of site. Contractor shall provide a detailed written work plan in preparation for this meeting.

1.4 PROGRESS MEETINGS

A. Contractor shall schedule and administer Project meetings throughout progress of the Work (unless this requirement is waived in writing by the Engineer), and other meetings as required to coordinate work, and pre-installation conferences.

B. Make physical arrangements for meetings, prepare agenda with copies for participants, preside at meetings, record minutes, and distribute copies within two days to Department, participants, and those affected by decisions made at meetings.

C. Attendance: Job superintendent, major subcontractors and suppliers; Department and consultants as appropriate to agenda topics for each meeting.

D. Minimum Required Agenda: Review of Work progress, status of progress schedule (including review and identification of critical path) and adjustments thereto, Work anticipated in the next two weeks (two week look ahead schedule), delivery schedules, submittals, maintenance of quality standards, pending changes and substitutions, and other items affecting progress of Work.

1.5 PRE-INSTALLATION CONFERENCES

A. When required in individual Specification section, or directed by the Engineer convene a pre-installation conference prior to commencing Work of the section.

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. Notify the Engineer four days in advance of meeting date.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01200

SECTION 01300 - SUBMITTALS

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

A. Procedures
B. Construction Progress Schedules
C. Schedule of Values
D. Shop Drawings, Product Data, and Samples
E. Manufacturer's Instructions and Certificates
F. Field Samples

1.2 RELATED REQUIREMENTS

A. Section 00700 - General Conditions
B. Section 00800 - Supplementary Conditions
C. Section 01010 - Summary of Work.
D. Section 01027 - Applications for Payment.
E. Section 01400 - Quality Control: Manufacturers' Field Services, Testing Laboratory Services.
F. Section 01600 - Material and Equipment: Products List.
G. Section 01700 - Contract Closeout: Closeout Procedures.

1.3 PROCEDURES

A. Deliver submittals to Engineer as directed.
B. Prior to the purchase or ordering of any materials or equipment, submit for approval complete data describing all items intended for use in the Work. Include the item's manufacturer, identifying number or nomenclature, and other information as necessary to describe the item. Also include the manufacturer's published data describing each items size, capacity, performance, and power requirements. Provide certification stating that the Contractor has reviewed the material and that all items conform with the Contract requirements. Submittals made without such certification will be returned unreviewed. This certification shall be in the form of a stamp on each material item submitted and signed or initialed. The name of the certifier shall be typed or legibly printed in or near the stamp.
C. Transmit each item under Department accepted form. Identify Project, Contractor, subcontractor, major Supplier, identify pertinent Drawing sheet and detail number, and Specification section number, as appropriate. Identify deviations from Contract Documents by submitting a Department supplied Substitution Request Form. Provide a minimum of 8-1/2" x 5-1/2" blank space on the front page for Contractor and Consultant review stamps. Provide submittals bound in loose leaf, hard cover, three ring binders complete with tabs and indexes by Specification Section. At the Engineer's option, partial submittals, which encompass less than a single section will be returned unreviewed or held unreviewed until the submittal is complete.
D. When substitute equipment is proposed, clearly and unambiguously mark submitted material describing the substitute to identify the differences between the qualities and characteristics of the offered substitute

and the specified material. Failure to provide this identification of differences when substitutes are submitted for consideration will result in rejection of the proposed material.

E. When equipment substitutions are approved and that equipment alters the design or space requirements indicated on the plans, the Contractor shall pay for all items of cost for the revised design and construction including costs of other trades involved and any engineering required to incorporate the approved substituted equipment into the Project. Department shall not pay for the required additional costs.

F. Material and equipment installed, purchased, furnished, or provided for the Project which has not been submitted and reviewed by the Engineer may be ordered removed and acceptable material and equipment installed in its place at no additional cost to the Department.

G. Submit initial Progress Schedules and Schedule of Values in accordance with Article SC-6.6 of Section 00800 - Supplementary Conditions prior to submitting first Application for Payment. Form and content shall be reviewed by the Engineer. After review by Engineer, revise and resubmit as required. Submit subsequent updated schedules (10) days prior to each Application for Payment.

H. Comply with progress schedule for submittals related to Work progress. Coordinate submittal of related items.

I. After Engineer review of submittal, revise and resubmit as required, identifying changes made since previous submittal. Provide total number of submittals as required for the first submission. If six are required and four were returned for revisions, submit six again. The Engineer and Consultants will not return the first or revised copies of rejected submittals for re-use. Do not submit partial copies of submittals for incorporation into rejected submittal packages, which have been kept by the Engineer and/or Consultants. Provide complete copies for each review.

J. If drawings, product submittals, samples, mock-ups, or other required submittals are incomplete or not properly submitted, the Engineer will not review the submittal and will immediately return submittal to Contractor. Engineer will review a submittal no more than two times (incomplete or improper submittals count as one). Contractor shall pay all review costs associated with more than two reviews, unless a resubmittal is required due to new comments addressing previously submitted information.

1.4 CONSTRUCTION PROGRESS SCHEDULES

A. Submit horizontal bar Gantt chart (see below for electronic version requirements). Schedule shall show:

1. Separate bar for each major trade or operation, identifying the duration of each activity and precedent activities. Duration of Activities shall be no longer than 14 calendar days unless otherwise approved by the project manager.
2. Coordinate listings with the schedule of values. All items on the schedule of values shall have an identical listing and ID number on the progress schedule. ID numbers shall be sequential. See Section 01300-1.05 Schedule of Values.
3. Complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Show each work plan and separate work area as a separate activity or group of activities.

4. Submittal dates for required Shop Drawings, product data, and samples, and product delivery dates, including those furnished by Department and those under allowances.
5. All required submittals and indicating the date for each required submittal.
6. Show projected percentages of completion for each item of Work and submittal as of time of each Application for Progress Payment. See below for electronic version requirements.
7. Submit Progress Schedule plotted on paper 11" X 17" from the electronic program in format approved by the Engineer. Provide in electronic form compatible with Microsoft Project 2010 only.
8. Submit Progress Schedule percentages in Tracking Gantt form plotted from and in electronic form as stated above.

1.5 SCHEDULE OF VALUES

A. FORMAT
1. Form and content must be acceptable to Engineer.
2. Contractor's standard form or media-driven printout will be considered on request.
3. Follow Table of Contents of Project Manual and Divisions Indicated on the drawings for listing component parts. Identify each line item by number and title of listed Specification Sections.

B. CONTENT
1. List only the installed value of each major item of Work and each subcontracted item of Work as a separate line item to serve as a basis for computing values for progress payments. Cost for items such as product submittals, shipping etc. shall be subsidiary to the installed item for which they apply. Round off values to nearest dollar.
2. For each major subcontract, list products and operations of that subcontract as separate line items.
3. Coordinate listings with progress schedule. All items on the schedule of values shall have an identical listing and ID number on the progress schedule. ID numbers need not be sequential.
4. Component listings shall each include a directly proportional amount of Contractor's overhead and profit.
5. For items on which payments will be requested for stored products, list sub-values for cost of stored products with taxes paid. Such items will have appropriate allowance for incorporating the stored material into the work.
6. Specific line item Values as indicated below shall be minimum acceptable amounts and must be included on all approved Schedules of Values and Applications for Payment.
   a. Section 01700 - Contract Closeout. Value of all required Substantial Completion Submittals and Closeout Submittals shall be not less than: See Supplementary Conditions, Article SC-6.6.2.
   b. No progress payments will be made for Substantial Completion Submittals and Closeout Submittals until all submittals have been submitted to and accepted by the Engineer. Allow up to one year after Final Completion for the Department to close out the project.
7. The sum of values listed shall equal total Contract Price.

C. SUBMITTAL

1. Submit four copies of Schedule of Values within 21 days after the Notice to Proceed. Subsequent updated Schedule of Values shall be presented for review ten days prior to each Application for Payment.
2. Transmit under Engineer accepted form transmittal letter. Identify Project by Department title and Project number; identify Contract by Department Contract number.

D. SUBSTANTIATING DATA

1. When Engineer requires substantiating information, submit data justifying line item amounts in question.
2. 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.

1.6 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

A. SHOP DRAWINGS:

1. Present in a clear and thorough manner. Label each Shop Drawing with Department's Project name and Project number; identify each element of the Shop Drawings by reference to sheet number and detail, schedule, or room number of Contract Documents.
2. Identify field dimensions; show relation to adjacent or critical features or Work or products.
3. Minimum Sheet Size: 8-1/2"x11". Larger sheets may be submitted in multiples of 8-1/2"x11".

B. PRODUCT DATA

1. Submit only pages which are pertinent; mark each copy of standard printed data to identify pertinent products, models, options, and other data, referenced to Specification section and Article number. Show reference standards, performance characteristics, and capacities; wiring and piping diagrams and controls; component parts; finishes; dimensions; and required clearances.
2. Modify manufacturer's standard schematic drawings and diagrams to supplement standard information to provide information specifically applicable to the Work. Delete information not applicable.

C. SAMPLES

1. Submit full range of manufacturer's standard finishes except when more restrictive requirements are specified, indicating colors, textures, and patterns, for Engineer selection.
2. Submit samples to illustrate functional characteristics of products, including parts and attachments.
3. Approved samples, which may be used in the Work, are indicated in the Specification section.
4. Label each sample with identification required for transmittal letter.
5. Provide field samples of finishes at Project, at location acceptable to Engineer, as required by individual Specification section. Install each sample complete and finished. Acceptable finishes in place may be retained in completed Work.

D. MANUFACTURER'S INSTRUCTIONS

1. When required in individual Specification Section, submit manufacturer's printed instructions for delivery, storage, assembly, installation, start-up, adjusting, balancing, and finishing, in quantities specified for product data.

2. Manufacturer's instructions for storage, preparation, assembly, installation, start-up, adjusting, balancing, and finishing under provisions of Section 01400.

E. CONTRACTOR REVIEW

1. Review submittals prior to transmittal; determine and verify field measurements, field construction criteria, manufacturer's catalog numbers, and conformance of submittal with requirements of Contract Documents.
2. Coordinate submittals with requirements of Work and of Contract Documents.
3. Sign or initial each sheet of Shop Drawings and product data, and each sample label to certify compliance with requirements of Contract Documents. Notify Engineer in writing at time of submittal, of any deviations from requirements of Contract Documents.
4. Do not fabricate products or begin Work that requires submittals until return of submittal with Engineer acceptance.

F. SUBMITTAL REQUIREMENTS

1. Each submittal to be numbered by Specification Section and Paragraph. Revisions shall be identified by a hyphen after the paragraph, with a letter designator. Example: 1st submittal "01010 1.08A", 2nd submittal 01010 1.08A - A".
2. Transmit submittals in accordance with the required submittal schedule and in such sequence to avoid delay in the Work.
3. Provide 8-1/2" x 5-1/2" blank space on each submittal for Contractor and Consultant stamps.
4. Apply Contractor's stamp, signed or initialed, certifying to review, verification of products, field dimensions and field construction criteria, and coordination of information with requirements of Work and Contract Documents.
5. Coordinate submittals into logical groupings to facilitate interrelation of the several items:
   a. Finishes which involve Engineer selection of colors, textures, or patterns.
   b. Associated items that require correlation for efficient function or for installation.
6. Submit number of opaque reproductions of shop drawings Contractor requires, plus two copies which will be retained by Department.
7. Submit number of copies of product data and manufacturer's instructions Contractor requires, plus two copies, which will be retained by Engineer.
8. Submit number of samples specified in individual Specifications sections.
9. Submit under Engineer accepted transmittal form letter. Identify Project by title and Department Project number; identify Contract by Department contract number. Identify Work and product by Specification section and Article number.
10. Each submittal shall have as its face document a completed Department furnished Submittal Summary form.
11. Each submittal shall include the manufacturer's name and address, and supplier's name, address and telephone number.

G. RESUBMITTALS

1. After Engineer review of submittal, revise and resubmit as required, identifying changes made since previous submittal. Provide total number of submittals as required for the first submission. If six are required and four were returned for revisions, submit six again. The Engineer and Consultants will not return the first or revised copies of rejected submittals for re-use. Do not submit partial copies of submittals for incorporation into rejected submittal packages which have been kept by the Department and/or Consultants. Provide complete copies for each review.

H. DEPARTMENT REVIEW

1. Engineer or authorized agent will review Shop Drawings, product data, and samples and return submittals within (14) working days.
2. Engineer or authorized agent will examine shop drawings for general arrangement, overall dimensions and suitability, and will return to the Contractor marked as follows:
3. "No Exceptions Taken" - denotes that the submittal generally meets the requirements of the Contract Documents. "No Exceptions Taken" does not indicate a review of the Contractor's design except for general compliance with the requirements of the Contract Documents.
4. "Make Corrections Noted" - denotes review is conditional on compliance with notes made on the submittal.
5. "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. Required revisions will be identified to the Contractor.
6. "Rejected" - denotes that the submittal does not meet the requirements of the Contract Documents and shall not be used in the Work. Reasons for rejection will be identified to the Contractor.
7. Review by the Department of shop and erection drawings 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 such drawings shall not relieve the Contractor of the responsibility for errors, dimensions, and detail design.
8. Engineer will require submittal of all required color and finish samples in order to approve any color or finish.

I. DISTRIBUTION

1. Duplicate and distribute reproductions of Shop Drawings, copies of product data, and samples, which bear Consultant's stamp, to job site file, record documents file, Subcontractors, Suppliers, and other entities requiring information.

J. SCHEDULE OF SUBMITTALS

1. Submittal Register Form to be completed by Contractor and approved by Engineer prior to submittal of any items.
2. Submit shop drawings, product data and samples as required for each specification section.
3. Format.
    a. Submittal schedule form as provided by Engineer.

1.7 MANUFACTURER'S INSTRUCTIONS

A. When required in individual Specification Section, submit manufacturer's printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for product data.

1.8 FIELD SAMPLES

A. Provide field samples of finishes as required by individual Specifications section. Install sample complete and finished. Acceptable samples in place may be retained in completed Work.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01300

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SECTION 01305 - SUBMITTAL LOG

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

A. Submittal Register Form required under the Contractor's Quality Control Program and Plan to meet the testing and quality control requirements in the Individual Specification Sections.

B. Test results and reports.

1.2 RELATED REQUIREMENTS

A. Bidding and Contract Requirement Section 00020 - Invitation for Bids: Material and Equipment Substitutions.

B. Bidding and Contract Requirement Section 00700 - General Conditions:

1. Article 6 - Contractor's Responsibilities (Substitutions, Evaluating Substitutions, Shop Drawings and Samples).
2. Article 9 - Changes.

C. Section 01027 - Applications for Payment: Procedures and Submittals.

D. Section 01028 - Change Order Procedure: Procedures and Submittals.

E. Section 01126 - Contractor's Certification of Subcontractors: Submittals.

F. Section 01300 - Submittals: Submittal Procedures.

G. Section 01400 - Quality Control: Procedures and Submittals.

H. Section 01500 - Construction Facilities and Temporary Controls: Procedures and Submittals.

I. Section 01600 - Material and Equipment: Contractor's Products List and Substitution Submittal Procedures.

J. Section 01700 - Contract Closeout: Closeout Procedures and Project Record Documents.

1.3 SUBMITTALS

A. Submit under transmittal letter specified in Section 01300 Submittals.

B. Submit the completed Submittal Register Form.

1.4 SUBMITTAL REGISTER FORM

A. The attached Submittal Register Form includes all of the submittals required by the Department from the Division 1 Specifications and the anticipated Division 2 through 49 submittals.

B. The Contractor needs to review and complete the Submittal Register Form for Divisions 2 through 49 as necessary.

C. The completed list needs to include additional shop drawings, product data, samples, certifications, qualification data, work plans, permits, and product schedules that are required by the Individual Specification Sections or that the Contractor wants the Engineer to review.

D. In addition, provide the dates that the Contractor anticipates transmitting each submittal, including the submittals required by the Department.

E. The Engineer will provide an electronic copy of the Submittal Register Form for the Contractor to complete and submit before the Preconstruction Meeting.

F. Do not provide any items until the Engineer accepts the Submittal Register Form.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01305

SECTION 01400 - QUALITY CONTROL

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

A. General Quality Control
B. Workmanship
C. Manufacturer's Instructions
D. Manufacturer's Certificates
E. Mockups
F. Manufacturers' Field Services
G. Testing Laboratory Services
H. Departmental Inspection Services

1.2 RELATED REQUIREMENTS

A. Section 00700 - General Conditions: Inspection and testing required by governing authorities.
B. Section 01010 - Summary of Work: Work Plans and Access to Facility, Individual Work Areas.
C. Section 01300 - Submittals: Shop Drawings, Product Data, and Samples

1.3 QUALITY CONTROL, GENERAL

A. Maintain quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

1.4 WORKMANSHIP

A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.
B. Perform Work by persons qualified to produce workmanship of specified quality.
C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

1.5 MANUFACTURERS' INSTRUCTIONS

A. Comply with instructions in full detail, including each step in sequence. Should instructions conflict with Contract Documents, request clarification from Department before proceeding.

1.6 MANUFACTURERS' CERTIFICATES

A. When required by individual Specifications section, submit manufacturer's certification, in duplicate, that products meet or exceed specified requirements.

1.7 MOCKUPS

A. When required by individual Specifications section, erect complete, full-scale mockup of assembly at site, perform required tests, and remove mockup at completion, when approved by Engineer.

1.8 MANUFACTURERS' FIELD SERVICES

A. When required by manufacturer or when specified in respective Specification sections, require manufacturer to provide qualified personnel to observe field conditions, conditions of surfaces and

installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to make appropriate recommendations.

B. Require manufacturer's representative to submit written report to Engineer listing observations and recommendations.

1.9 TESTING LABORATORY SERVICES

A. Contractor shall employ and pay for services of an independent testing laboratory to perform inspections, tests, and other services required by individual Specification sections.

B. Services will be performed in accordance with requirements of governing authorities and with specified standards.

C. Reports will be submitted to Engineer giving observations and results of tests, indicating compliance or non-compliance with specified standards and with Contract Documents.

D. Contractor shall cooperate with testing laboratory personnel; furnish tools, samples of materials, mix design, equipment, storage and assistance as requested.

1. Notify Engineer and testing laboratory 72 hours prior to expected time for operations requiring testing services.
2. Make arrangements with testing laboratory and pay for additional samples and tests for Contractor's convenience.

1.10 DEPARTMENTAL INSPECTION SERVICES

A. REQUEST AND PAYMENT

1. Contractor shall request and when applicable pay for services provided by the Department to perform specified inspection and testing.
2. Inspection by the Department or its agents shall in no way relieve Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

B. QUALITY ASSURANCE

1. Comply with requirements of all referenced standards.
2. Department shall retain a registered Engineer and/or Architect on staff to provide review services in those areas of their immediate expertise.
3. Testing equipment shall be calibrated at reasonable intervals with devices of an accuracy traceable to either NBS Standards or accepted values of natural physical constants.

C. DEPARTMENT RESPONSIBILITIES

1. Review schedules and request for inspections as submitted by Contractor for timeliness and conformance.
2. Provide qualified personnel at site after due notice; cooperate with Contractor in performance of services.
3. Perform specified inspection, inventorying, and testing of products in accordance with specified standards.
4. Ascertain compliance of materials and equipment with requirements of Contract Documents.
5. Promptly notify Contractor of observed irregularities or non-conformance of Work or products.

6. Perform additional inspections and re-tests required by the Contract Documents.
7. When applicable provide to the Contractor a written description of Department's costs attributed to the inspection.

D. DEPARTMENT REPORTS

1. After each inspection and/or test, promptly submit one copy of inspection report to Contractor. Include: Date issued, Project title and Department Project number, name of inspector(s), date and time of inspection, identification of product and Specifications section, location in the Project, type of inspection or test, results of inspection or tests, and conformance with Contract Documents. When requested in writing by Contractor, provide interpretation of results.

E. LIMITS ON AUTHORITY RESULTING FROM INSPECTIONS

1. Engineer may not release, revoke, alter, or enlarge on requirements of Contract Documents through the issuance of an inspection report.
2. Engineer may not approve or accept any portion of the Work through the issuance of an inspection report.
3. Engineer may not assume any duties of Contractor through the issuance of an inspection report.
4. Engineer has no authority to stop Work through the issuance of an inspection report.

F. CONTRACTOR RESPONSIBILITIES

1. Cooperate with Department personnel, and provide access to Work and when appropriate, to manufacturer's facilities.
2. Provide incidental labor and facilities to provide access to Work to be inspected, to obtain and furnish incidental supplies at the site or at source of products to be inspected, to facilitate tests and inspections, and for storage and curing of test samples when appropriate.
3. Notify Department as stated above in Contractor Submittals for operations requiring inspection, special inspection and testing services.
4. Pay costs of Department furnished services for all re-inspections as required by Contract Documents.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01400

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SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

A. Electricity, Lighting
B. Heat, Ventilation
C. Telephone Service
D. Water
E. Sanitary Facilities
F. Dust Control (Exterior)
G. Dust Control
H. Noise Control
I. Construction Enclosures
J. Barriers
K. Barricades, Warnings, and Markings
L. Protection of Installed Work
M. Security
N. Water Control
O. Fencing and Security
P. Materials Storage and Protection
Q. Site and Off-Site Storage
R. Owner Access
S. Utility Locates
T. Marking of Contractor Vehicles
U. Parking
V. Protection of Existing Facilities
W. Protection of Existing Vegetation, Structures, Utilities, and Improvements
X. Salvage
Y. Temporary Enclosure and Space Heating
Z. Environmental Requirements
AA. Construction Cleaning
BB. Removal
CC. Waste Storage Equipment
DD. Cleaning of the Project Area
EE. Disposal

1.2 RELATED REQUIREMENTS

A. Section 01010 - Summary of Work: Use of Premises.
B. Section 01010 - Summary of Work: Shutoffs and Disruptions to Service.

C. Section 01700 - Contract Closeout: Final cleaning.

1.3 ELECTRICITY, LIGHTING

A. The Contractor may utilize power from existing facility. All tie-ins are the Contractor's responsibility and must be coordinated with the Engineer.

B. Connect to existing service, provide branch wiring and distribution boxes located to allow service and lighting by means of construction-type power cords. Department will pay costs of energy used.

C. Provide lighting for construction operations. The Contractor shall include in its bid the cost of providing, and shall provide, general construction area lighting wherever work is in progress and wherever lighting is required for the safety of any person employed on the site.

D. Take precautions to conserve energy. Wasteful use of power will be back-charged to the Contractor.

1.4 HEAT, VENTILATION

A. Not Applicable

1.5 TELEPHONE SERVICE

A. Provide telephone service if required for construction operations. Use of telephones in existing facilities will not be allowed.

1.6 WATER

A. The Contractor may utilize water from the Department’s existing facility. All tie-ins are the Contractor's responsibility and must be coordinated with the Engineer.

B. Provide service required for construction operations. Extend branch piping with outlets located so that water is available by use of hoses.

C. The Using Agency will pay for water used.

D. Hoses or temporary piping will not be permitted in public areas where a hazard to the public may be created.

1.7 SANITARY FACILITIES

A. Existing facilities may not be used during construction operations unless specifically approved by the Engineer. The Contractor is responsible for providing adequate temporary sanitary facilities for his employees in accordance with all state and local regulation. The Contractor shall maintain all such temporary sanitary facilities in a clean sanitary condition.

1.8 DUST CONTROL (EXTERIOR)

A. The Contractor shall be responsible for dust control on the project site. The Contractor shall include in its bid the cost of providing, and shall provide, labor and equipment necessary to fulfill his responsibilities under this Article.

B. Execute Work by methods that minimize raising of dust or airborne debris from construction or demolition operations.

C. Provide positive means to prevent airborne dust from dispersing or entering any portion of the building.

1.9 DUST CONTROL

A. Execute Work by methods to minimize raising dust from construction operations.

B. Provide active means to prevent airborne dust from dispersing into occupied areas.

C. Water mist work surfaces to control dust while cutting.

1.10 NOISE CONTROL

A. Provide methods, means, and facilities to minimize noise produced by construction operations.

1.11 CONSTRUCTION ENCLOSURES

A. Not Applicable

1.12 BARRIERS

A. Provide as required to prevent public entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.

B. Provide barricades and covered walkways required by authorities having jurisdiction for public rights-of-way and for public access to existing facility.

C. Maintain clear route to allow access of emergency vehicles to the facility and emergency entrances.

1.13 BARRICADES, WARNINGS, AND MARKINGS

A. The Contractor shall furnish, erect, and maintain all barricades, warning signs and markings for hazards, as necessary to protect the employees from construction operations, and to protect the Work. All safeguards shall be constructed in conformance with local codes.

B. For vehicular and pedestrian traffic, the Contractor shall furnish, erect, and maintain barricades, warning signs, lights and other traffic control devices in conformity with the Manual of Uniform Traffic Control Devices for Streets and Highways (published by the United States Government Printing Office), or as approved by the Engineer.

1.14 PROTECTION OF INSTALLED WORK

A. Provide temporary protection for installed products. Control traffic in immediate area to minimize damage.

1.15 SECURITY

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

B. The Contractor shall be responsible for security of any area of the site turned over to the Contractor for his exclusive use.

1.16 WATER CONTROL

A. Protect the interior of facilities from water and/or moisture infiltration.

1.17 FENCING AND SECURITY

A. The Department will not provide security of any kind and shall not be liable to anyone for, or for the lack of, security. Each subcontractor shall include in its bid the cost to provide, and shall provide, such fencing and security as may be necessary in addition to the requirements of this section.

1.18 MATERIALS STORAGE AND PROTECTION

A. An area will be assigned to the Contractor for materials storage in the closest possible proximity to the project site. Providing protection and security for the area is the responsibility of the Contractor. Any materials stored outside of the buildings being worked on under this contract will be kept in an agreed upon storage area.

B. The Contractor shall include a proposed staging area onsite for material storage within the Traffic Control Plan to be submitted to the Engineer for review and approval.

1.19 SITE AND OFF-SITE STORAGE

A. The Contractor shall include in its bid the cost to provide, and shall provide, such special security work for which he is contractually responsible, the allocation of job-site storage space for temporary job-site facilities, and the furnishing of off-site storage space, if sufficient job-site storage is not available.

1.20 OWNER ACCESS

A. Existing roads and parking areas shall be kept open at all times for the flow of traffic from existing facilities.

1.21 UTILITY LOCATES

A. Contractor shall be responsible for obtaining all utility locates. Contractor shall arrange with utility locate services for locating utilities such as telephone and communications, video cable, water, sewer, electric, fuel lines, etc. Hand dig within two feet of all utilities to avoid damaging existing facilities.

1.22 MARKING OF CONTRACTOR VEHICLES

A. All Contractor vehicles used on the job site shall be marked with Contractor's Name (as it appears on his business license) and telephone number. This may be a magnetic sign on the door, sign in window or other, providing it is visible and legible.

1.23 PARKING

A. The Contractor and his employees may park their vehicles in parking areas designated by the Engineer. There will be no authorized parking in fire lanes and delivery lanes unless authorized by the Engineer and then only for loading and unloading materials for and debris from the project. Provide and maintain access to fire hydrants and control valves free of obstructions.

1.24 PROTECTION OF EXISTING FACILITIES

A. The Contractor shall include in its bid the cost to provide, and shall provide, the locating and protecting of the existing facilities or any other public facilities whether or not such facilities be on the site of the work.

B. The Contractor will be held responsible for all damages and/or claims resulting out of this contract.

C. The Contractor will be held responsible for the repair of any damages to the existing facility as a result of this contract.

D. The Contractor shall provide and maintain full safe access at existing exits at all times.

E. The Contractor shall take all necessary precautions to protect the building occupants from any hazards created by the progress of this work.

1.25 PROTECTION OF EXISTING VEGETATION, STRUCTURES, UTILITIES, AND IMPROVEMENTS

A. The Contractor will preserve and protect all existing vegetation such as trees, shrubs, and grass on or adjacent to the site of work which is not to be removed and which does not unreasonably interfere with the construction work. Care will be taken in removing trees authorized for removal to avoid damage to vegetation to remain in place. Any lines or branches of trees broken during such operations or by the careless operation of equipment, or by workmen, shall be trimmed with a clean cut and painted with an approved tree pruning compound as directed by the Engineer.

B. The Contractor will protect from damage all existing improvements or utilities at or near the site of the work, the location of which is made known to him, and will repair or restore any damage to such facilities resulting from failure to comply with the requirements of this contract or the failure to exercise reasonable care in the performance of the work. If the Contractor fails or refuses to repair any such damages promptly, the Department may have the necessary work performed and charge the cost thereof to the Contractor.

1.26 SALVAGE

A. All materials excavated and any other materials on the site at the time of award are the property of the Department. The Contractor shall provide in its bid the cost to dispose of, and shall dispose of, salvage materials and/or materials which may be surplus to the requirements of the work, provided that the Department, at its sole option, may direct that salvage and/or surplus materials shall be delivered to, unloaded, and stored at place of storage on the Department's property. Such place of storage will be within one mile and a half of the project site.

B. All items or materials removed from the project shall be made available for the Department's inspection. The Department retains the option to claim any item or material. The Contractor shall deliver any claimed item or material in good condition to the place designated by the Department. All items not claimed become the property of the Contractor and shall be removed from the site by the Contractor.

C. Salvage materials shall not include trash, lumber or concrete debris, or debris of any nature. Trash and debris shall be disposed of off-site in accordance with federal, state, and local statutes.

1.27 TEMPORARY ENCLOSURE AND SPACE HEATING

A. The Contractor shall include in its bid the cost to provide, and shall provide, such temporary insulated weather-tight enclosures of the work and such space heating as may be required to protect the work from damage due to freezing temperatures, snow and rain, and to allow orderly coordinated progress of all work.

1.28 ENVIRONMENTAL REQUIREMENTS

A. General. The Contractor shall include in its bid the cost of complying, and shall comply, and shall require each of its subcontractors to comply, with this section and also each local, state, and federal Environmental Law and Regulation.

B. Provide methods, means, and facilities to prevent contamination of soil, water, and air from discharge of noxious, toxic substances and pollutants produced by construction operations.

C. Dust Prevention. Should the site produce visible dust, the Contractor shall, when directed by the Department, forthwith, apply a palliative which prevents the dust from drifting or being wind-driven off the site.

1.29 CONSTRUCTION CLEANING

A. In accordance with Part 3 of this specification.

1.30 REMOVAL

A. Remove temporary utilities, materials, equipment, facilities, services, and construction prior to Substantial Completion inspection.

B. Clean and repair damage caused by installation or use of temporary facilities.

C. Restore existing facilities used during construction to specified, or to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 WASTE STORAGE EQUIPMENT

A. Provide covered containers for collection of waste materials, debris, and rubbish; and for the transportation of same from point of generation to point of disposal. Containers shall be adequately secured to prevent release of waste materials.

3.2 CLEANING OF THE PROJECT AREA

A. Conduct cleaning and disposal operations to comply with codes, ordinances, regulations and anti-pollution laws.

B. Use only those cleaning materials which will not create hazards to health or property and will not damage surfaces.

C. Control accumulation of waste materials and rubbish; dispose of daily off-site. Maintain areas under Contractor's control free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

D. Clean periodically to keep the Work, the site, and adjacent properties free from accumulations of waste materials, rubbish, and wind-blown debris resulting from construction operations.

E. Remove debris, rubbish, and combustible material from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to closing the space.

F. Control cleaning operations so that dust and other contaminates will not adhere to wet or newly-coated surfaces.

G. Maintain manpower and equipment, including dust mops, wet mops, brooms, buckets, and clean wiping rags for cleaning fine dust from floors in adjacent occupied areas.

3.3 DISPOSAL

A. Promptly remove waste materials, debris, and rubbish from the site periodically and dispose of off the site in accordance with all federal, state and local regulations.

B. Tightly covered containers shall be used to remove debris from the facility through all occupied areas to minimize dust and contamination from demolition materials. Facility waste containers and dumpsters shall not be used by the Contractor.

C. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids. If conditions dictate, chute and containers shall be sprayed with water to maintain dust control. Chute opening shall be closed when not in use.

END OF SECTION 01500

SECTION 01600 - MATERIALS AND EQUIPMENT

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

A. Products
B. Transportation and Handling
C. Storage and Protection
D. Product Options
E. Products List
F. Substitutions
G. Systems Demonstration

1.2 RELATED REQUIREMENTS

A. Section 01010 - Summary of Work.
B. Section 01300 - Submittals
C. Section 01400 - Quality Control: Manufacturers' Certificates.
D. Section 01700 - Contract Closeout: Closeout Procedures, Spare Parts and Maintenance Materials.
E. Section 01730 - Operation and Maintenance Data,
F. Section 01740 - Warranties and Bonds.

1.3 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.
E. The Contractor shall be held responsible for any and all products to be installed under this contract. The Contractor shall be required to make good at his own cost any injury or damage which said materials or equipment may sustain from any source or cause whatsoever prior to substantial completion and using agency occupancy of that specific portion of the work.
F. Reuse of Existing Materials
    1. The Contractor shall not reuse any materials or equipment which are not specifically noted to be reused without written permission of the Engineer. In cases where existing materials are found to be in usable condition, but not indicated to be reused by the contract documents, the contractor shall upon written approval of the Engineer, incorporate these items into the project and an appropriate change order to the contract will be written.
G. All products will be delivered, unloaded inside the appropriate building and completely installed by the Contractor, or his authorized agent.

1.4 TRANSPORTATION AND HANDLING

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

B. Provide equipment and personnel to handle products by methods to prevent soiling or damage.

C. Immediately on delivery, inspect shipment to ensure:

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.

1.5 STORAGE AND PROTECTION

A. Handle and store materials for construction, products of demolition, and other items to avoid damage to existing property and facilities.

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. Arrange storage to provide access for inspection. Periodically inspect to ensure products are undamaged, and are maintained under required conditions.

D. Provide Material Safety Data Sheets (MSDS) for all products which may produce unpleasant or noxious odors. Contractor shall provide for adequate venting if needed.

E. 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.

F. 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 onto the site.

1.6 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards.

B. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions by meeting product description: Submit a request for substitution for any manufacturer not specifically named that meets the product description specifications.

C. Products Specified by Naming Only One Manufacturer with No Provision for Substitutions: No options, no substitutions allowed.

D. Products Specified by Naming One or More Manufacturers followed by the term "No Substitutions": Use only specified manufacturers, no substitutions allowed.

1.7 PRODUCTS LIST

A. Within 21 days after date of Notice to Proceed, transmit four copies of a list of products, which are proposed for installation, including name of manufacturer.

B. Tabulate products by Specifications section number, title, and Article number.

C. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

D. Department will reply in writing within five days stating whether there is reasonable objection to listed items. Failure to object to a listed item shall not constitute a waiver of requirements of Contract Documents.

1.8 SUBSTITUTIONS

A. SUBSTITUTION SUBMITTAL PERIOD

1. Product substitution requests will be considered only within 14 days after date established in Notice to Proceed. Subsequent requests will be considered only in case of product unavailability or other conditions beyond control of Contractor. (Submit on Substitution Request Form "B")

B. LIMITATIONS ON SUBSTITUTIONS

1. Only one request for substitution will be considered for each product from each Contractor. When substitution is not accepted, Contractor shall provide specified product.
2. Substitutions will not be considered when indicated on Shop Drawings or product data submittals.
3. Substitute products shall not be ordered or installed without written acceptance.
4. Department will determine acceptability of substitutions.

C. REQUESTS FOR SUBSTITUTIONS

1. Submit separate request for each substitution. Document each request with complete data substantiating compliance of proposed substitution with requirements of Contract Documents.
2. Identify product by Specification section and Article numbers. Provide manufacturer's name and address, trade name of product, and model or catalog number. List fabricators and Suppliers as appropriate.
3. Attach product data as specified in Section 01300.
4. List similar projects using product, dates of installation, and names of design Consultant(s) and Owner.
5. Give itemized comparison of proposed substitution with specified product, listing variations, and reference to Specification sections and Article numbers.
6. Give quality and performance comparison between proposed substitution and the specified product.
7. Give cost data comparing proposed substitution with specified product, and amount of net change to Contract Price.
8. List availability of maintenance services and replacement materials.
9. State effect of substitution on construction schedule, and changes required in other Work or products.

D. CONTRACTOR REPRESENTATION

1. Request for substitution constitutes a representation that Contractor has investigated proposed product and has determined that it is equal to or superior in all respects to specified product.
2. Contractor will provide same warranty for substitution as for specified product.
3. Contractor will coordinate installation of accepted substitute, making such changes as may be required for Work to be complete in all respects.

4. Contractor certifies that cost data presented is complete and includes all related costs under this Contract.
5. Contractor waives claims for additional costs related to substitution which may later become apparent.

E. SUBMITTAL PROCEDURES

1. Submit two copies of complete request for Substitution Request Form. Request to include complete product information and data, color swatch board, and certification that proposed product meets or exceeds all requirements for the specified product.
2. Engineer will review Contractor's requests for substitutions within 14 days of receipt.
3. After receipt of submittal, Engineer will notify Contractor, in writing, of decision to accept or reject requested substitution within 14 days.
4. For accepted products, submit Shop Drawings, product data, and samples under provisions of Section 01300.

1.9 SYSTEMS DEMONSTRATION

A. Prior to final inspection, demonstrate operation of each system to Engineer and Owner.

B. Instruct Department’s personnel in operation, adjustment and maintenance of equipment and systems, using the operation and maintenance data as the base of instruction.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 EXECUTION

A. The Contractor shall not unreasonably encumber the site with materials and equipment.

B. The Contractor is responsible for protection and safekeeping of products stored on the premises, and shall move any stored products which interfere with operations of the Department.

C. The Contractor is responsible for any and all associated materials and labor necessary to provide a finished appearance.

END OF SECTION 01600

SECTION 01700 - CONTRACT CLOSEOUT

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

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

1.2 RELATED REQUIREMENTS

A. Section 00700 - General Conditions: Fiscal provisions, legal submittals, and other administrative requirements.
B. Section 01010 - Summary of Work: Using Agency occupancy.
C. Section 01400 – Quality Control: Departmental Inspection Services.
D. Section 01500 - Construction Facilities and Temporary Controls: Cleaning during construction.
E. Section 01720 – Project Record Documents
F. Section 01730 – Operation and Maintenance Data
G. Section 01740 – Warranties and Bonds

1.3 CONTRACT CLOSEOUT PROCEDURES

A. SUBSTANTIAL COMPLETION
   1. Submit the following prior to requesting a Substantial Completion inspection:
      a. Evidence of Compliance with Requirements of Governing Authorities:
         1) Certificate of Occupancy.
         2) Required Certificates of Inspection.
      b. Project Record Documents in accordance with Section 01720
      c. Operation and Maintenance Data in accordance with Section 01730
      d. Warranties and Bonds in accordance with Section 01740
      e. Spare Parts and Maintenance Materials in accordance with Section 01700-1.08
   2. Substantial Completion shall be considered by the Engineer when:
      a. Written notice is provided 10 days in advance of inspection date.
      b. List of items to be completed or corrected is submitted.
      c. Operation and Maintenance Manuals are submitted and approved by the Engineer.
      d. Equipment and systems have been tested, adjusted, balanced and are fully operational.
      e. Automated and manual controls are fully operational.
      f. Operation of system has been demonstrated to Department personnel.

g. Certificate of Occupancy is submitted.
h. Certificates of Inspection for required inspections have been submitted.
i. Project Record Documents for the Work or the portion of the Work being accepted are submitted and approved.
j. Spare parts and maintenance materials are turned over to the Department.
k. All keys are turned over to the Department.

3. Should Department inspection find Work is not substantially complete, the Engineer will promptly notify Contractor in writing, listing observed deficiencies.
4. The Contractor shall remedy deficiencies and send a second written notice of Substantial Completion.
5. When the Department finds Work is substantially complete, the Engineer will prepare a Certificate of Substantial Completion in accordance with provisions of General Conditions.
6. Department will occupy existing facilities for the conduct of business, under provisions stated in Certificate of Substantial Completion

B. FINAL COMPLETION

1. When Contractor considers Work is complete, submit written certification that:
   a. Contract Documents have been reviewed.
   b. Work has been inspected for compliance with Contract Documents.
   c. Equipment and systems have been tested, adjusted and are fully operational.
   d. Operation of systems has been demonstrated to Department's personnel.
   e. Work has been completed in accordance with Contract Documents, and deficiencies listed with Certificate of Substantial Completion have been corrected.
   f. Work is complete and ready for final inspection.
2. Should the Department inspection find Work incomplete, Engineer will promptly notify Contractor in writing listing observed deficiencies.
3. Contractor shall remedy deficiencies and send a second certification of Final Completion.
4. When Department finds Work is complete, Engineer will consider closeout submittals.

C. REINSPECTION FEES

1. Should status of completion of Work require more than one re-inspection by the Department due to failure of Work to comply with Contractor's responsibility, the Engineer will deduct the cost of re-inspection from final payment to Contractor as provided in the Contract Documents.
2. Re-inspection fees shall not exceed $5,000 for any one re-inspection.

D. CLOSEOUT SUBMITTALS

1. Warranties and Bonds in accordance with Section 01740 Warranties and Bonds.
2. Evidence of Payment in accordance with Conditions of the Contract.
3. Consent of Surety to Final Payment.
4. Certificates of Insurance for Products and Completed Operations in accordance with Supplementary Conditions.
5. Certificate of Release.

E. APPLICATION FOR FINAL PAYMENT

1. Submit application for final payment in accordance with provisions of the General Conditions of the Contract.
2. Engineer will issue a final Change Order reflecting all remaining adjustments to Contract Price not previously made by Change Orders.
3. The full amount of the Schedule of Values line item labeled “Contract Closeout” will be withheld as a portion of the final payment.
4. Final payment will not be executed until the Engineer has fully reviewed the Project records and found them to be in compliance with the Contract Documents.

1.4 FINAL CLEANING

A. Execute final cleaning prior to Substantial Completion inspection.

B. Remove grease, adhesives, dust, dirt, fingerprints, temporary labels, stains, and other foreign substances from interior and exterior surfaces exposed to view. Clean roofs, gutters, downspouts, and drainage systems.

C. Remove waste, debris, and surplus materials from the site. Clean grounds; remove stains, spills, and foreign substances from paved areas and sweep clean. Rake clean other exterior surfaces.

1.5 PROJECT RECORD DOCUMENTS

A. In accordance with Section 01720 Project Record Documents.

1.6 OPERATION AND MAINTENANCE INSTRUCTIONS

A. In accordance with Section 01730 Operation and Maintenance Data.

1.7 WARRANTIES

A. In accordance with Section 01740 Warranties and Bonds.

1.8 SPARE PARTS AND MAINTENANCE MATERIALS

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

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

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01700

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SECTION 01720 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

A. Maintenance of Record Documents.

B. Submittal of Record Documents.

1.2 RELATED REQUIREMENTS

A. Document 00700 - General Conditions.

B. Section 01300 - Submittals: Shop drawings, product data.

C. Section 01700 - Contract Closeout.

D. 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 or designated location, for the Engineer one 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. Inspection certificates.
8. Manufacturer's certificates.

B. Prior to Substantial Completion, provide original or legible copies of each item maintained by the Contractor as listed in Section 01720, 1.3A above.

C. Delegate responsibility for maintenance of Record Documents to one person on the Contractor’s staff as approved in advance by the Engineer.

D. Promptly following award of contract, secure from Engineer, at no charge to Contractor, one complete set of all documents comprising the Contract.

E. Immediately upon receipt of job set, described above, stamp each document with title “RECORD DOCUMENTS - JOB SET.”

F. Store Record Documents apart from documents used for construction. Provide secure storage for Record Documents.

G. Label and file Record Documents 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 Engineer.

J. Keep Record Documents and samples available for inspection by Engineer.

K. Engineer's approval of current status of Record Documents will be prerequisite to Engineer's approval of and request for final payment.

1. Prior to submitting request for final payment, submit final Record Documents to Engineer and secure his approval.

L. Do not use job set for any purpose except entry of new data and for review and copying by Engineer.

1.4 RECORDING

A. Record information on a set of black line or opaque Drawings, and in a copy of a Project Manual, provided by Engineer.

B. Using colored 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. Accuracy of records shall be such that future search for items shown in Contract Documents may reasonably rely on information obtained from approved Record Documents.

D. Record all entries within 24 hours of receipt of information and concurrently with construction progress. Do not conceal any Work until required information is recorded.

E. Contract Drawings and Shop Drawings: Legibly mark each item to record actual construction, including:

1. Use all means necessary, including proper tools for measurement, to determine actual location of installed items.
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. Where changes are caused by Contractor-originated proposals approved by Engineer, including inadvertent errors by Contractor which have been accepted by Engineer, clearly indicate change by note.
7. Show on job set Record Drawings, by dimension accurate within one inch (1”), centerline of each run of items described in sub-paragraphs 3 and 4 above. Identify item by accurate note such as “Intercom Control Unit”, etc. Show by symbol or note, vertical location of item (in ceiling plenum”, “exposed”, etc.). Make all identification sufficiently descriptive that it may be related reliably to Specifications.

F. Specifications: Legibly mark each item to record actual construction, including:

1. Manufacturer, trade name, and catalog number of each product actually installed, particularly optional items and substitute items.
2. Changes made by Addenda and Modifications.

1.5 SUBMITTALS

A. Upon submittal of completed total set of Record Documents to Engineer, participate in review meeting(s) as required by Engineer, make required changes in Record Documents, and promptly deliver final Record documents to Engineer and samples under provisions of Section 01700.

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

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01720

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SECTION 01730 - OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

A. Format and content of manuals.

B. Instruction of Department personnel.

C. Schedule of submittals.

1.2 RELATED REQUIREMENTS

A. Section 01300 - Submittals: Submittals procedures.

B. Section 01300 - Submittals: Shop drawings, product data, and samples.

C. Section 01700 - Contract Closeout.

D. Section 01720 - Project Record Documents.

E. Section 01740 - Warranties and Bonds.

F. Individual Specifications Sections: Specific requirements for operation and maintenance data.

1.3 QUALITY ASSURANCE

A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

1.4 FORMAT

A. Prepare data in the form of an instructional manual.

B. Binders: Commercial quality, 8-1/2 x three-ring binders with hardback, cleanable, plastic covers; one inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

C. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; list title of Project; identify subject matter of contents.

D. Arrange content by systems, under section numbers and sequence of Table of Contents of this Project Manual.

E. Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

F. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.

G. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

1.5 CONTENTS, EACH VOLUME

A. Table of Contents: Provide Department’s Project title; Department’s Project number; names, addresses, and telephone numbers of Consultant(s) and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

B. For Each Product or System: List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.

D. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control diagrams. Do not use Project Record Documents as maintenance drawings.

E. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

F. Warranties and Bonds: Bind in copy of each.

1.6 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Each Item of Equipment and Each System: Include description of unit or system, and component parts. Give function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

B. Include as-installed color coded wiring diagrams.

C. Operating Procedures: Include start-up and routine normal operating instructions and sequences. Include control, shut-down, and emergency instructions. Include any special operating instructions.

D. Maintenance Requirements: Include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

E. Provide servicing schedule.

F. Include manufacturer's printed operation and maintenance instructions.

G. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

H. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

I. Additional Requirements: As specified in individual Specifications sections.

1.7 INSTRUCTION OF OWNER PERSONNEL

A. Before final inspection, instruct Department designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times.

B. Use operation and maintenance manuals as basis of instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

C. Prepare and insert additional data in Operation and Maintenance Manual when need for such data becomes apparent during instruction.

1.8 SUBMITTALS

A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Engineer will review draft and return one copy with comments.

B. For equipment, or component parts of equipment put into service during construction and operated by Department, submit documents within ten days after acceptance.

C. Submit one copy of completed volumes in final form 15 days prior to final inspection. Copy will be returned after final inspection, with Engineer comments. Revise content of documents as required prior to final submittal.

D. Submit two copies of revised volumes of data in final form within ten days after final inspection.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01730

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SECTION 01740 - WARRANTIES AND BONDS

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

A. Format and content of manuals.

B. Schedule of submittals.

1.2 RELATED REQUIREMENTS

A. Section 00700 – General Conditions.

B. Section 01700 - Contract Closeout.

C. Section 01730 – Operation and Maintenance Data.

D. Individual Specifications Sections: Specific requirements for operation and maintenance data.

1.3 FORM OF SUBMITTALS

A. Bind in commercial quality, 8-1/2 x 11 inch three-ring binders with hardback, cleanable, plastic covers.

B. Label cover or each binder with typed or printed title “WARRANTIES AND BONDS”; with title of Project and Department Project number; name, address and telephone number of Contractor; and name of responsible principal.

C. Table of Contents: Neatly typed, in the sequence of the table of contents of the Project manual, with each item identified with the number and title of the Specification section in which specified, and the name of product or Work item.

D. Separate each warranty or bond with index tab sheets keyed to the table of contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, Supplier, and manufacturer, with name, address, and telephone number of responsible principle.

1.4 PREPARATION OF SUBMITTALS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, Suppliers, and manufacturers, within ten days after completion of the applicable item of Work. Except for items put into use with Engineer permission, leave date of beginning of time of warranty until the date of Final Completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Retain warranties and bonds until time specified for submittal.

1.5 TIME OF SUBMITTALS

A. Warranty period for equipment begins at Substantial Completion, unless otherwise approved by Engineer.

B. For equipment or component parts of equipment put into service during construction with Engineer permission, submit documents within ten days after acceptance.

C. Make other submittals within ten days after date of Final Completion, prior to final Application for Payment.

D. For items of Work when acceptance is delayed beyond date of Final Completion, submit within ten days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01740

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments. Mix designs shall be based on actual site conditions included aggregate to be used, batching, and mixing equipment

C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement.

1.3 INFORMATIONAL SUBMITTALS

A. Material certificates.

B. Material test reports.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

B. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

1.5 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1.

1. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301 (ACI 301M).
2. ACI 117 (ACI 117M).

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.3 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

2.4 CONCRETE MATERIALS

A. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type I or Type III, gray.

B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 3/4-inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Air-Entraining Admixture: ASTM C 260/C 260M.

D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.

4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

E. Water: ASTM C 94/C 94M and potable.

2.5 CURING MATERIALS

A. Evaporation retarders temporarily reduce moisture loss from concrete surfaces awaiting finishing in hot, dry, and windy conditions. Evaporation retarders are not curing compounds.

B. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

2.6 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

2.7 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8-inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8-to-1/4-inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4-inch and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8-to-1/4-inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.8 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301 (ACI 301M).

B. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for slabs, and concrete with a w/c ratio below 0.50.

2.9 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Normal-Weight Concrete:

1. Minimum Compressive Strength: 4,000 psi at 28 days.
2. Maximum W/C Ratio: 0.45.
3. Slump Limit: 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1-inch.
4. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.10 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.11 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class B, 1/4-inch for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEM INSTALLATION

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

3.4 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete after batching according to approved concrete mix design.

C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

3.5 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to slab surfaces unless otherwise indicated.
2. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4-inch.

3.6 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

3.7 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 (ACI 301M) for hot-weather protection during curing.

B. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.8 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Owner. Remove and replace concrete that cannot be repaired and patched to Owner’s approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2-inch in any dimension to solid concrete. Limit cut depth to 3/4-inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, pop-outs, honeycombs, rock pockets, crazing and cracks in excess of 0.01-inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.

3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4-inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1-inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1-inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to approval, using epoxy adhesive and patching mortar.

3.9 FIELD QUALITY CONTROL

A. Testing and Inspecting: The Contractor shall provide batch ticket showing the concrete mix. The delivered batch shall be in conformance with the approved mix design and placed per the specifications. The Owner reserves the right to test the concrete or perform in-situ testing. If the Owner’s testing show the placed concrete did not meet specifications, the Contractor shall remove and replace the concrete at his expense and reimburse the costs of testing to the Owner. The Contractor shall also be responsible for any ancillary costs of removing and reinstalling items that may have been built on the defective concrete.

END OF SECTION 033000

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SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Wood blocking and nailers.
3. Sill plates.

1.2 DEFINITIONS

A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.

B. Dimension Lumber: Lumber of 2 inches nominal size or greater but less than 5 inches nominal size in least dimension.

C. Exposed Framing: Framing not concealed by other construction.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

B. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated wood.
2. Power-driven fasteners.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber 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. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.
3. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 DIMENSION LUMBER FRAMING

A. All framing: No. 2 grade.

1. Species:

a. Spruce-pine-fir; NLGA.

2.4 FASTENERS

A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

2.5 METAL FRAMING ANCHORS

A. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.

1. Use for interior locations unless otherwise indicated.

B. Hot-Dip, Heavy-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); G185 coating designation; and not less than 0.036-inch thick.

1. Use for wood-preservative-treated lumber and where indicated.

C. Stainless-Steel Sheet: ASTM A 666, Type 304.

1. Use for exterior locations and where indicated.

D. Hold-Downs: Brackets for bolting to wall studs and securing to foundation walls with anchor bolts or to other hold-downs with threaded rods and designed with first of two bolts placed seven bolt diameters from reinforced base.

2.6 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4-inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.

C. Install hold downs to comply with approved delegated design and Shop Drawings.

D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

E. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.

F. Do not splice structural members between supports unless otherwise indicated.

G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide blocking at corners and intersections where framing or blocking does not provide a surface for fastening edges of interior panels.

H. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

I. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

J. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
2. ICC-ES evaluation report for fastener.

K. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work including mechanical and electrical attachments. Form and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

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SECTION 061200 - STRUCTURAL INSULATED PANELS (SIPS)

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Structural Insulated Panels (SIPs).

B. Related Sections: Section(s) related to this section include:

1. Section 061000 “Rough Carpentry.”

1.2 SYSTEM DESCRIPTION

A. Structural Insulated Panels (SIPs) consist of oriented strand board (OSB) laminated with structural adhesives to an insect resistant EPS insulation core, and SIP Manufacturer supplied connecting splines, sealants, and SIP screws.

1.3 REFERENCES

A. ACSE 7 - Minimum Loads for Buildings and other Structures.

B. ASTM C578 – Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

C. ASTM E1803 – Standard Test Method for Determining Structural Capacities of Insulated Panels.

D. DOC PS2 – Performance Standard for Wood-based Structural-Use Panels.

E. ICC ES AC04 – Acceptance Criteria for Sandwich Panels.

F. ICC ES AC05 – Acceptance Criteria for Sandwich Panel Adhesives.

G. ICC ES AC12 – Acceptance Criteria for Foam Plastic Insulation.

H. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

I. ASTM E1333- Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber.

J. EPA - Registered products listing.

1.4 COORDINATION

A. Coordinate sizes and locations of concrete foundations and casting of hold down anchors and anchor bolts into foundation. Anchor rod installation, concrete, reinforcement, and formwork requirements are specified in Section 033000 "Cast-in-Place Concrete

1.5 DELEGATED DESIGN

A. Provide a complete, integrated set of mutually dependent components and assemblies that form a SIP building system capable of withstanding structural and other loads.

B. Design and engineer SIP panels and connections to conform to the 2009 International Building Code with loads as indicated on the Drawings.

C. Provide a complete anchorage design to foundation including anchor bolts and hold downs.

1.6 SUBMITTALS

A. Product Data:

1. SIP Code Compliance: Submit a code report / material listing report for SIPs showing evidence of compliance with code requirements as an alternate method of construction. Submit current compliance report from an International Accreditation Service (IAS) Accredited Product Certification Agency that has demonstrated compliance with ISO Guide 65, General requirements for bodies operating product certification systems, showing conformance to the International Building Code (IBC) and International Residential Code (IRC).

    a. Shear Wall use: The submitted code report / material listing report shall include all load cases for transverse, axial and racking shear loading for the SIPs. The report must demonstrate that the SIPs may be used as shear walls in all Seismic Design Categories A, B, C, D, E and F.

2. EPS Code Compliance: Submit ICC ES code report for EPS foam with evidence of compliance with code. Submit current compliance report numbers from ICC ES with conformance to the International Building Code (IBC) and International Residential Code (IRC). Code report shall include compliance with ICC ES AC12.
3. Mastic: Submit MSDS data showing mastic has either 300 g/l or less VOC content or zero g/l VOC content depending on which mastic is specified.
4. Manufacturer’s Instructions: Submit SIP Manufacturer’s construction detail book and load design charts.

B. Calculations: Submit structural calculations by a design professional registered in the state the project is being constructed in and qualified to perform the design work.

1. Gravity design.
2. Lateral design.
3. Anchorage to foundation.

C. Shop Drawings:

1. Submit Shop Drawings for SIPs showing layout, elevations, product components and accessories.
2. Submit Shop Drawings for details of connections to withstand required structural loads.

3. Submit Shop Drawings showing required anchorage to foundation.

D. Quality Assurance Submittals - Submit the following:

1. SIPs: Submit SIP product certificate showing compliance to Third Party Quality Control program of Underwriters Laboratories, Inc.
2. EPS Core: Submit EPS Insulation manufacturer's certificate showing compliance to Third Party Quality Control program of Underwriters Laboratories, Inc.
3. Labels: Submit a copy of the label approved by the Inspection Agency certifying that manufacture of panels complies with specified performance characteristics and physical properties.
4. Structural Insulated Panel Association (SIPA) Manufacturer Member in Good Standing: Submit SIPA certificate as evidence showing SIP Manufacturer is a SIPA manufacturing member in good standing.
5. Formaldehyde Emission Rates: Submit evidence that the SIP manufacturer has tested the panels in accordance with ASTM E1333 by and IAS accredited testing laboratory and the result of the testing shows formaldehyde levels below 0.03 ppm.

E. Fire Resistant Assemblies - Submit the following:

1. Submit UL construction number or a code report / material listing report describing each fire-rated assembly.
2. Submit UL certificate showing flame spread and smoke developed information.

F. Warranty: Submit SIP manufacturer's standard warranty document.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Installer shall be experienced in performing work of this section and should have specialized in installation of work similar to that required for this project.

B. Source Limitations: Obtain all SIPs through one manufacturer. All accessories to be furnished or recommended by the SIP manufacturer.

C. SIP Manufacturer shall be a Manufacturing Member, in good standing, of the SIPA.

1.8 REGULATORY REQUIREMENTS

A. SIPs shall be recognized for compliance in a current IAS accredited evaluation report or material listing report compliant with the 2009 IBC and 2009 IRC.

B. Pre-installation Meeting: Conduct pre-installation meeting to verify project requirements, foundation/structural system/substrate conditions, SIP manufacturer's installation instructions and SIP manufacturer's warranty requirements. Comply with Division 01 Project Management and Coordination (Project Meetings) Section.

1.9 DELIVERY, STORAGE & HANDLING

A. Ordering: Comply with SIP manufacturer's ordering instructions and lead time requirements to avoid construction delays.

B. Delivery: Deliver materials from SIP manufacturer with identification labels or markings intact.

C. Off-load SIPs from truck or barge and handle using fork lift or other means to prevent damage to SIPs.

D. SIPs shall be fully supported in storage and prevented from contact with the ground Storage must always be at least 12 inches above grade and not above standing water. Stack SIPs on pallets or on supports at a maximum of four feet on center.

E. SIPs shall be fully protected from weather. Protect against exposure to rain, water, dirt, mud, and other residue that may affect SIP performance. Cover stored SIPs with breathable protective wraps. SIPs shall be stored in a protected area.

1.10 WARRANTY

A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.

B. Manufacturer's Warranty: SIP Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

1. Warranty Period: Twenty (20) years from the date of issue of the warranty.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURES / SUPPLIERS

A. Premier SIPs, 19727 57th Ave. E., Puyallup, WA 98375. Phone 800-275-7086.

B. R Control, Big Sky Insulations, Inc. 15 Arden Drive, Belgrade, MT 59714. Phone 800-766-3626.

2.2 MATERIALS

A. SIPs consisting of the following:

1. EPS core UL certified for fire and physical properties of ASTM C578 Type I EPS with borate insect resistant treatment. Insulation manufacturer shall provide Third Party UL certificate.
2. OSB identified with APA or PFS performance mark with Exposure I durability rating and performance in accordance with DOC PS-2 span rating 24/16 or greater.
3. Laminating Adhesives shall be in conformance with ICC ES AC05 – Acceptance Criteria for Sandwich Panel Adhesives.

2.3 ACCESSORIES

A. Splines: OSB, Premier SIP Spline, or I-beam for use in joining SIPs shall be supplied by SIPs manufacturer.

B. Fasteners: corrosion resistant SIP screws compatible with SIP system shall be provided by the SIPs manufacturer.

1. Wood Screws for attachment to wood members.
2. Heavy Duty Metal Screws for attachment to metal members (16 gauge to 1/4-inch).
3. Light Duty Metal Screws for attachment to metal decks (18 gauge or thinner).

C. SIP Mastic: Shall be specifically designed for use with SIPs. Mastic must be compatible with all components of the SIP. Mastic shall be provided by the SIP manufacturer.

D. Dimensional Lumber: SPF, #2 or better, or engineered equivalent unless otherwise required by structural Drawings.

E. Vapor Retarder SIP Tape: Tape with an adhesive suitable for indoor use, min. 6-inch wide for use on SIP joints, 18-inch wide for use at roof beams. SIP Tape shall be supplied by the SIP manufacturer.

F. Anchor bolts: 5/8-inch diameter or larger galvanized A307 headed anchor bolts and hold down anchors as required for structural loads. 3-by-3-by-1/4-inch galvanized plate washers as required.

G. Hold downs: Simpson or approved manufacturer product for hold down anchorage.

2.4 FABRICATION

A. Sizes: SIPs shall be fabricated in accordance with approved Shop Drawings.

B. Thermal Resistance, R-value:

1. 8-1/4 inches thick SIP with R-value of 30.0 at 75 deg F and an R-value of 31.0 at 40 deg F.
2. 12-1/4 inches thick SIP with R-value of 46.0 at 75 deg F and an R-value of 47.0 at 40 deg F.

2.5 PRODUCT SUBSTITUTIONS

A. Substitutions: No substitutions permitted.

2.6 RELATED MATERIALS

A. Related Materials: Refer to other sections for related materials as follows:

1. Dimensional Lumber: SPF #2 or better or pre-engineered equivalent: Refer to Division 6 Carpentry Sections.

2.7 SOURCE QUALITY

A. Source Quality Assurance: Each SIP component required shall be supplied by SIP manufacturer and shall be obtained from selected SIP manufacturer or its approved supplier.

1. Each SIP shall be labeled indicating UL or other ISO Guide 65 approved Third Party certification.
2. Provide evidence of UL Third Party inspection and labeling of all insulation used in manufacture of SIPs.
3. SIP manufacturer shall provide Lamination/R-Value Warranty documents for building owner acceptance and execution. Manufacturer's standard forms will be submitted.
4. Provide SIPs with EPS treated for insect resistance. Treatment shall be EPA registered.
5. Dimensional Tolerance - shall comply with values listed in the manufacturer's Quality Control Manual.

B. Source Quality: Obtain SIPs from a single manufacturer.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's ICC-ES or material listing report, Load Design Charts, Detail Book, approved Shop Drawings, and Product data, including product technical bulletins, for installation.

3.2 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions.

1. Verify conditions of foundation/structural system/substrate and other conditions which affect installation of SIPs. Any adverse conditions shall be reported in writing to the SIP manufacturer and the design professional. Do not proceed with installation until adverse conditions are corrected.

3.3 INSTALLATION

A. SIP Installation:

1. SIP Supports: Provide level and square foundation/structural system/substrate that support wall and/or roof SIPs. For wall SIPs, allow full bearing of OSB skins. Provide access holes for electrical wire chases in SIPs. Provide adequate bracing of SIPs during erection. Remove debris from plate area prior to SIP placement.
2. SIP Fastening: Connect SIPs by nails or staples as shown on approved Shop Drawings. SIP mastic must be used together with each fastening techniques.

Where SIP Screw Fasteners are used, provide a minimum of 1-inch penetration into support. Join SIPs using plates and splines. Secure attachment with nails, staples, or screws, and SIP mastic. Apply SIP mastic following SIP manufacturer recommendations.

3. SIP Tape: Provide SIP Tape at joints between SIP wall panels, roof panels and at intersection of SIP roof and wall panels and as shown in SIP Manufacturer's details.
4. Vapor Retarders: Provide vapor retarders as indicated.
5. Restrictions: Do not install SIPs directly on concrete. Do not put plumbing in SIPs without consulting SIP manufacturer. Do not over cut skins for field-cut openings and do not cut skins for electrical chases. SIPs shall be protected from exposure to solvents and their vapors that damage the EPS foam core.
6. Remove and replace insulated wall or roof SIPs which have become excessively wet or damaged before proceeding with installation of additional SIPs or other work.

3.4 FIELD QUALITY REQUIREMENTS

A. Moisture content of SIPS panels.

1. Contractor is responsible for confirmation that panel faces are less than 18 percent moisture content prior to being covered with any vapor retarder or self-adhered membrane. Panels over 18 percent shall be protected from weather, ventilated and monitored with location documented until moisture content is confirmed to be less than 18 percent.

3.5 PROTECTION

A. Protection: Protect installed product and finish surfaces from damage during construction.

1. Roof SIPs: Protect roof SIPs from weather by roofing materials to provide temporary protection at the end of the day or when rain or snow is imminent.
2. After installation, cover SIPs to prevent contact with water on each exposed SIP edges and faces.

END OF SECTION 061200

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SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Foam-plastic board insulation.
2. Spray Polyurethane Foam Insulation: For sealing voids over 1/2-inch.
3. Spray Polyurethane Foam Sealant: For sealing voids less than 1/2-inch.
4. Vapor retarders.

1.2 ACTION SUBMITTALS

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

1.3 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Research/evaluation reports.

PART 2 - PRODUCTS

2.1 FOAM-PLASTIC BOARD INSULATION

A. Extruded-Polystyrene Board Insulation: ASTM C 578, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. DiversiFoam Products.
b. Dow Chemical Company (The).
c. Owens Corning.
d. Pactiv Building Products.

2. Type VI, 40 psi.

2.2 ACCESSORIES

A. Insulation for miscellaneous voids.

1. Spray Polyurethane Foam Insulation: ASTM C 1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

2. Spray Polyurethane Foam Sealant: Low expanding type; “Enerfoam” by Dow Chemical, Inc.; “Tytan Professional” by Selena USA, Inc.; OSI “GreenSeries 28-Ounce Pro Foam II” by Henkel; or approved equal.
3. Insulation Anchors, Spindles, and Standoffs: As recommended by manufacturer.

2.3 VAPOR RETARDERS

A. Polyethylene Vapor Retarders: ASTM D 4397, 6-mil- (0.15-mm-) thick sheet, with maximum permeance rating of 0.1 perm (5.7 ng/Pa x s x sq. m).

B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

C. Vapor-Barrier Sealant: Non-hardening, non-skinning gun applied sealant; Tremco Acoustical Sealant, or equal.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.2 INSTALLATION OF INSULATION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

C. Foam-Plastic Board Insulation: Seal joints between units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill

voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

3.3 INSTALLATION OF VAPOR RETARDERS

A. Place vapor retarders on side of construction indicated on Drawings. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives or other anchorage system as indicated. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

B. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs or 24 inches on SIPS and sealing with vapor-retarder sealant and tape according to vapor-retarder manufacturer's written instructions. Locate all joints over framing members or other solid substrates.

C. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.

D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

END OF SECTION 072100

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SECTION 072500 - WEATHER BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Building wrap.
2. Self-Adhering Sheet Membrane.

B. Related Sections:

1. Section 073113 “Asphalt Shingles.”

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For water-resistive barrier and self-adhering sheet membrane, from ICC-ES.

1.4 WARRANTY

A. Roofing Underlayment Warranty: Manufacturer's standard 20 year material warranty.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

A. Building Wrap: ASTM E 1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. DuPont Building Innovations: E. I. du Pont de Nemours and Company.
b. Pactiv Corporation.
c. Raven Industries, Inc.

2. Water-Vapor Permeance: Not less than 50 g through 1 sq. m of surface in 24 hours per ASTM E 96/E 96M, Desiccant Method (Procedure A).
3. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
4. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

B. Self-Adhering Sheet Membrane: Self-adhesive rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025-inch (0.6-mm). Provide high temperature type where recommended by manufacturer.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Carlisle Coatings & Waterproofing Inc.
b. Grace Construction Products; W.R. Grace & Co. -- Conn.
c. Polyguard Products, Inc.

PART 3 - EXECUTION

3.1 BUILDING WRAP INSTALLATION

A. Cover wall sheathing with building wrap weather-resistive barrier as follows:

1. Cut back barrier 1/2-inch (13-mm) on each side of the break in supporting members at expansion- or control-joint locations.
2. Apply barrier to cover vertical flashing with a minimum 4-inch (100-mm) overlap unless otherwise indicated.

B. Building Wrap: Comply with manufacturer's written installation instructions.

1. Seal seams, edges, fasteners, and penetrations with tape.
2. Extend into jambs of openings and seal corners with tape. Coordinate with window manufactures flashing instructions.

C. Protection:

1. Protect any installed building wrap from wind damage.
2. Replace any torn or frayed building wrap prior to installation of covering finish.

3.2 SELF-ADHERING SHEET MEMBRANE INSTALLATION

A. Coordinate with other work; schedule work to assure self-adhering membrane will not be exposed to direct sunlight beyond manufacturer’s recommended time frames.

B. Verify that environmental conditions are within manufacturer’s accepted range for temperature and wind prior to beginning installation. Protect installed product per manufactures written instruction.

C. Verify that substrates are dry and of moisture content acceptable to self-adhering sheet membrane manufacturer prior beginning installation.

D. Apply self-adhering sheet membrane where indicated to comply with manufacturer's written instructions.

1. Lap seams and junctures with other materials at least 4 inches (100 mm) except that at flashing flanges of other construction, laps need not exceed flange width.
2. Lap flashing over water-resistive barrier at bottom and sides of openings and as indicated on Drawings.
3. Lap self-adhering sheet membrane shingle fashion to shed water on sloped surfaces.
4. Roll and smooth seams to provide full water tight closure without excessive wrinkles and fish mouths.

END OF SECTION 072500

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SECTION 073113 - ASPHALT SHINGLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Asphalt shingles.
2. Metal flashing and trim.

B. Related Sections:

1. Section 072500 “Weather Barriers.”

1.2 DEFINITION

A. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each type of asphalt shingle and underlayment product indicated, for tests performed by manufacturer and witnessed by a qualified testing agency.

C. Sample Warranty: For manufacturer's warranty.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Asphalt Shingles: 1 unbroken bundle.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of the item.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store roofing materials in a dry, well-ventilated location protected from weather, sunlight, and moisture according to manufacturer's written instructions.

B. Protect unused roofing materials from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

C. Handle, store, and place roofing materials in a manner to prevent damage to roof deck or structural supporting members.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended in writing by manufacturer.

1.10 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace asphalt shingles that fail within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Manufacturing defects.

2. Material Warranty Period: Manufacturer’s standard.
3. Workmanship Warranty Period: Two years from date of Substantial Completion.

B. Roofing Installer's Warranty: On warranty form at end of this Section, signed by Installer, in which Installer agrees to repair or replace components of asphalt-shingle roofing that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

C. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Exterior Fire-Test Exposure: Provide asphalt shingles and related roofing materials identical to those of assemblies tested for Class A fire resistance according to ASTM E 108 or UL 790 by Underwriters Laboratories or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.

2.2 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

A. Three-Tab-Strip, SBS-Modified Asphalt Shingles: ASTM D 3462/D 3462M, glass-fiber reinforced, mineral-granule surfaced, and self-sealing; with tabs regularly spaced and complying with UL 2218, Class 4.

1. Basis-of-Design Product: Subject to compliance with requirements, provide “Alaskan” by Malarkey Roofing Company, or comparable product.
2. Strip Size: Manufacturer's standard.
3. Color and Blends: As selected by Architect from manufacturer's full range.

2.3 ACCESSORIES

A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.

B. Roofing Nails: ASTM F 1667; aluminum, stainless-steel, copper, or hot-dip galvanized-steel wire shingle nails, minimum 0.120-inch- (3-mm-) diameter, sharp-pointed, with a minimum 3/8-inch- (9.5-mm-) diameter flat head and of sufficient length to penetrate 3/4 inch (19 mm) into solid wood decking or extend at least 1/8 inch (3 mm) through OSB or plywood sheathing.

1. Shank: Barbed.
2. Where nails are in contact with metal flashing, use nails made from same metal as flashing.

C. Synthetic-Underlayment Fasteners: As recommended in writing by synthetic-underlayment manufacturer for application indicated.

2.4 METAL FLASHING AND TRIM

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

B. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and pre-painted by the coil-coating process to comply with ASTM A 755/A 755M.

1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation; structural quality.
2. Exposed Coil-Coated Finish:

a. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.

3. Color: As selected by Architect from manufacturer's full range.

C. Vent Pipe Flashings: ASTM B 749, Type L51121, at least 1/16 inch (1.6 mm) thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof, and extending at least 4 inches (100 mm) from pipe onto roof.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provisions have been made for flashings and penetrations through asphalt shingles.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

A. General: Comply with underlayment manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

3.3 METAL FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

B. Rake Drip Edges: Install rake drip-edge flashings over underlayment and fasten to roof deck.

C. Eave Drip Edges: Install eave drip-edge flashings below underlayment and fasten to roof sheathing.

D. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

3.4 ASPHALT-SHINGLE INSTALLATION

A. General: Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and recommendations in NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."

B. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.

END OF SECTION 073113

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SECTION 074633 - PLASTIC SIDING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes vinyl siding.

1.2 COORDINATION

A. Coordinate siding installation with flashings and other adjoining construction to ensure proper sequencing.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

1. For vinyl siding, include VSI's official certification logo printed on Product Data.

B. Samples for Initial Selection: For vinyl siding including related accessories.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For vinyl siding Installer.

B. Product Certificates: For each type of vinyl siding.

C. Research/Evaluation Reports: For each type of vinyl siding required, from ICC-ES.

D. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of product, including related accessories, to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish full lengths of vinyl siding including related accessories, in a quantity equal to 2 percent of amount installed.

1.8 QUALITY ASSURANCE

A. Vinyl Siding Installer Qualifications: A qualified installer who employs a VSI-certified Installer on Project.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with labels intact until time of use.

B. Store materials under cover.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace products that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including cracking and deforming.
b. Deterioration of materials beyond normal weathering.

2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain products, including related accessories, from single source from single manufacturer.

2.2 VINYL SIDING

A. Vinyl Siding: Integrally colored product complying with ASTM D 3679.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. CertainTeed Corporation.

B. Vinyl Siding Certification Program: Provide products that are listed in VSI's list of certified products.

C. Horizontal Pattern: 8-inch (203-mm) exposure in plain, double, 4-inch (102-mm) board style.

D. Texture: Wood grain.

E. Nominal Thickness: 0.044-inch (1.1-mm).

F. Minimum Profile Depth (Butt Thickness): 1/2-inch (13-mm).

G. Nailing Hem: Double thickness.

H. Finish: Wood-grain print with clear protective coating containing not less than 70 percent PVDF.

1. Colors: As selected by Architect from manufacturer's full range of colors.

2.3 ACCESSORIES

A. Siding Accessories, General: Provide starter strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer for building configuration.

1. Provide accessories made from same material as adjacent siding unless otherwise indicated.

B. Vinyl Accessories: Integrally colored vinyl accessories complying with ASTM D 3679 except for wind-load resistance.

1. Texture: Wood grain.

C. Flashing: Provide metal flashings at window and door heads and where indicated as follows.

1. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and pre-painted by the coil-coating process to comply with ASTM A 755/A 755M.

2. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation; structural quality.

3. Exposed Coil-Coated Finish: Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.

4. Color: As selected by Architect from manufacturer's full range.

D. Fasteners:

1. For fastening to wood, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1-inch (25-mm) into substrate.

2. For fastening to metal, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1/4-inch (6-mm), or three screw-threads, into substrate.

3. For fastening vinyl, use hot-dip galvanized fasteners. Where fasteners are exposed to view, use prefinished aluminum fasteners in color to match item being fastened.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of vinyl siding and related accessories.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

3.3 INSTALLATION

A. General: Comply with manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

1. Center nails in elongated nailing slots without binding siding to allow for thermal movement.

B. Install vinyl siding and related accessories according to ASTM D 4756.

1. Install fasteners for horizontal vinyl siding no more than 16 inches (400 mm) o.c.

C. Install joint sealants as specified in Section 079200 "Joint Sealants" and to produce a weathertight installation.

D. Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

E. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

3.4 ADJUSTING AND CLEANING

A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.

B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 074633

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Urethane joint sealants.
2. Mildew-resistant joint sealants.
3. Latex joint sealants.
4. Joint-sealant backing.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product.

B. Samples: For each kind and color of joint sealant required.

C. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Sample warranties.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

1.6 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following:

1. Architectural sealants shall have a VOC content of 250 g/L or less.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 URETHANE JOINT SEALANTS

A. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Bostik, Inc.
b. Pecora Corporation.
c. Sika Corporation.

2.3 MILDEW-RESISTANT JOINT SEALANTS

A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Dow Corning Corporation.
b. GE Construction Sealants; Momentive Performance Materials Inc.
c. Soudal USA.

C. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. BASF Corporation-Construction Systems.
b. Pecora Corporation.
c. Sherwin-Williams Company (The).

2.4 JOINT-SEALANT BACKING

A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) Type O (open-cell material) Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.5 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove laitance and form-release agents from concrete.
2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

3.2 INSTALLATION OF JOINT SEALANTS

A. General: Comply with ASTM C 1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

1. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.3 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:

a. Perform 5 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.4 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

a. Exterior wall and opening perimeter joints.
b. Other joints as indicated on Drawings.

2. Joint Sealant: Urethane, S, NS, 25, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

a. Control and expansion joints on exposed interior surfaces of exterior walls.
b. Tile control and expansion joints.
c. Other joints as indicated on Drawings.

2. Joint Sealant: Urethane, S, NS, 25, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement.

1. Joint Locations:

a. Control joints on exposed interior surfaces of exterior walls.
b. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
c. Other joints as indicated on Drawings.

2. Joint Sealant: Acrylic latex.
3. Joint-Sealant Color: Paintable white.

D. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
b. Tile control and expansion joints where indicated.
c. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

E. Joint-Sealant Application: Concealed mastics.

1. Joint Locations:

a. Aluminum thresholds.
b. Sill plates.
c. Other joints as indicated on Drawings.

2. Joint Sealant: Butyl-rubber based.
3. Joint-Sealant Color: Manufacturer’s standard.

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes hollow-metal work for doors and frames.

1.2 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, and other details.

C. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Amweld International, LLC.
2. Ceco Door Products; an Assa Abloy Group company.
3. Curries Company; an Assa Abloy Group company.
4. Mesker Door Inc.
5. Republic Doors and Frames.
6. Steelcraft; an Ingersoll-Rand company.

2.2 EXTERIOR HOLLOW-METAL DOOR AND FRAME

A. Extra-Heavy-Duty Door and Frame: SDI A250.8, Level 3.

1. Physical Performance: Level A according to SDI A250.4.

2. Doors:

   a. Type: As indicated on Drawings.
   b. Thickness: 1-3/4 inches (44.5 mm).
   c. Face: Metallic-coated steel sheet, minimum thickness of 0.053-inch (1.3-mm), with minimum A40 (ZF120) coating.
   d. Edge Construction: Model 1, Full Flush.
   e. Core: Polyisocyanurate.

3. Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (R-value) of not less than 10 when tested according to ASTM C 518.
4. Frames:

   a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053-inch (1.3-mm), with minimum A40 (ZF120) coating.
   b. Construction: Face welded.

5. Exposed Finish: Factory.

2.3 FRAME ANCHORS

A. Jamb Anchors:

1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042-inch (1.0-mm) thick.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042-inch (1.0-mm):

2.4 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

2.5 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Provide sealed flush top edge at all exterior doors. Seal joints in top edges of doors against water penetration.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
2. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
3. Jamb Anchors: Provide number and spacing of anchors as follows:

a. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:

1) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.

b. Compression Type: Not less than two anchors in each frame.

D. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

2.6 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: SDI A250.10.

B. Factory Finish: SDI A250.3.

1. Color and Gloss: As selected by Architect from manufacturer's full range.

2.7 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Grout Guards: Formed from same material as frames, not less than 0.016-inch (0.4-mm) thick.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

a. At fire-rated openings, install frames according to NFPA 80.
b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
c. Install frames with removable stops located on secure side of opening.
d. Install door silencers in frames before grouting.
e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.

5. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: Plus or minus 1/16-inch (1.6-mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16-inch (1.6-mm), measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16-inch (1.6-mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16-inch (1.6-mm), measured at jambs at floor.

B. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:

    a. Between Door and Frame Jambs and Head: 1/8-inch (3.2-mm) plus or minus 1/32-inch (0.8-mm).
    b. Between Edges of Pairs of Doors: 1/8-inch (3.2-mm) to 1/4-inch (6.3-mm) plus or minus 1/32-inch (0.8-mm).
    c. At Bottom of Door: 5/8-inch (15.8-mm) plus or minus 1/32-inch (0.8-mm).
    d. Between Door Face and Stop: 1/16-inch (1.6-mm) to 1/8-inch (3.2-mm) plus or minus 1/32-inch (0.8-mm).

3.2 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

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SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Finish Hardware for door openings, except as otherwise specified herein.

1. Door hardware for steel (hollow metal) doors.
2. Keyed cylinders as indicated.

B. References: Comply with applicable requirements of the following standards. Where these standards conflict with other specific requirements, the most restrictive shall govern.

1. Builders Hardware Manufacturing Association (BHMA).
2. NFPA 101 Life Safety Code.
3. NFPA 80 – Fire Doors and Windows.
4. ANSI-A156.xx- Various Performance Standards for Finish Hardware.
5. UL10C – Positive Pressure Fire Test of Door Assemblies.
6. ANSI-A117.1 – Accessible and Usable Buildings and Facilities.
7. DHI/ANSI A115.IG – Installation Guide for Doors and Hardware.
8. ICC – International Building Code.

1.2 SUBMITTALS

A. Product Data: Manufacturer's specifications and technical data including the following:

1. Detailed specification of construction and fabrication.
2. Manufacturer's installation instructions.

B. Contract Closeout Submittals: Comply with Division 1 including specific requirements indicated.

1. Operating and maintenance manuals.

    a. Complete information in care, maintenance, and adjustment, and data on repair and replacement parts, and information on preservation of finishes.
    b. Catalog pages for each product.
    c. Name, address, and phone number of local representative for each manufacturer.
    d. Parts list for each product.

2. Copy of final keying schedule.
3. One set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping: Comply with Division 1.

1. Deliver products in original unopened packaging with legible manufacturer's identification.
2. Package hardware to prevent damage during transit and storage.
3. Deliver hardware to door and frame manufacturer upon request.

B. Storage and Protection: Comply with manufacturer's recommendations.

1.4 PROJECT CONDITIONS

A. Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for the proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents.

B. Review Shop Drawings for doors and entrances to confirm that adequate provisions will be made for the proper installation of hardware.

1.5 WARRANTY

A. Refer to Conditions of the Contract

B. Manufacturer’s Warranty:

1. Closers: Thirty years.
2. Exit Devices: Five Years.
3. Locksets & Cylinders: Lifetime.
4. All other Hardware: Two years.

1.6 OWNER’S INSTRUCTION

A. Instruct Owner’s personnel in operation and maintenance of hardware units.

1.7 MAINTENANCE

A. Extra Service Materials: Deliver to Owner extra materials from same production run as products installed.

1. Maintenance Tools: Provide maintenance tools and accessories supplied by hardware component manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. The following manufacturers are approved subject to compliance with requirements of the Contract Documents. Approval of manufacturers other than those listed shall be in accordance with Division 1.

Item:	**Manufacturer:**	**Approved:**
Hinges	Stanley	Bommer, McKinney
Locksets	Best	No Substitution
Cylinders	Best	No Substitution
Exit Devices	Von Duprin 98	Precision 2100
Closers	LCN 4040	Stanley QDC100
Push/Pull Plates	Trimco	Hager, Don-Jo
Push/Pull Bars	Trimco	Hager, Don-Jo
Protection Plates	Trimco	Hager, Don-Jo
Overhead Stops	ABH	Rixson,Glynn Johnson
Door Stops	Trimco	Hager, Don-Jo
Flush Bolts	Trimco	ABH, Don-Jo
Coordinator	Trimco	ABH, Don-Jo
Threshold & Gasket	Pemko	Reese, National Guard

2.2 MATERIALS

A. Hinges: Shall be Five Knuckle Ball bearing hinges.

1. Template screw hole locations.
2. Bearings are to be fully hardened.
3. Bearing shell is to be consistent shape with barrel.
4. Minimum of 2 permanently lubricated non-detachable bearings on standard weight hinge and 4 permanently lubricated bearing on heavy weight hinges.
5. Equip with easily seated, non-rising pins.
6. Non Removable Pin screws shall be slotted stainless steel screws.
7. Hinges shall be full polished, front, back and barrel.
8. Hinge pin is to be fully plated.
9. Bearing assembly is to be installed after plating.
10. Sufficient size to allow 180-degree swing of door.
11. Furnish five knuckles with flush ball bearings.
12. Provide hinge type as listed in schedule.
13. Furnish 3 hinges per leaf to 7 foot 6 inch height. Add one for each additional 30 inches in height or fraction thereof.
14. Tested and approved by BHMA for all applicable ANSI Standards for type, size, function and finish.

B. Mortise Type Locks and Latches:

1. Tested and approved by BHMA for ANSI A156.13, Series 1000, Operational Grade 1, Extra-Heavy Duty, Security Grade 2 and be UL10C.

2. Furnish UL or recognized independent laboratory certified mechanical operational testing to 4 million cycles minimum.
3. Provide 9001-Quality Management and 14001-Environmental Management.
4. Fit ANSI A115.1 door preparation.
5. Solid, one-piece, 3/4-inch (19-mm) throw, anti-friction latchbolt made of self-lubricating stainless steel.
6. Deadbolt functions shall have 1-inch (25-mm) throw bolt made of hardened stainless steel.
7. Latchbolt and Deadbolt are to extend into the case a minimum of 3/8-inch (9.5-mm) when fully extended.
8. Auxiliary deadlatch to be made of one piece stainless steel, permanently lubricated.
9. Provide sufficient curved strike lip to protect door trim.
10. Lever handles must be of forged or cast brass, bronze or stainless steel construction and conform to ANSI A117.1. Levers that contain a hollow cavity are not acceptable.
11. Lock shall have self-aligning, thru-bolted trim.
12. Levers to operate a roller bearing spindle hub mechanism.
13. Mortise cylinders of lock shall have a concealed internal setscrew for securing the cylinder to the lockset. The internal setscrew will be accessible only by removing the core, with the control key, from the cylinder body.
14. Spindle to be designed to prevent forced entry from attacking of lever.
15. Provide locksets with 7-pin removable and interchangeable core cylinders.
16. Each lever to have independent spring mechanism controlling it.
17. Core face must be the same finish as the lockset.

C. Cylinders:

1. Provide the necessary cylinder housings, collars, rings & springs as recommended by the manufacturer for proper installation.
2. Provide the proper cylinder cams or tail piece as required to operate all locksets and other keyed hardware items listed in the hardware sets.
3. Coordinate and provide as required for related sections.

D. Door Closers shall:

1. Tested and approved by BHMA for ANSI 156.4, Grade 1.
2. UL10C certified.
3. Provide 9001-Quality Management and 14001-Environmental Management.
4. Closer shall have extra-duty arms and knuckles.
5. Conform to ANSI 117.1.
6. Maximum 2-7/16-inch case projection with non-ferrous cover.
7. Separate adjusting valves for closing and latching speed, and backcheck.
8. Provide adapter plates, shim spacers and blade stop spacers as required by frame and door conditions.
9. Full rack and pinion type closer with 1-1/2-inch minimum bore.
10. Mount closers on interior side of door.
11. Closers shall be non-handed, non-sized and multi-sized.

E. Kickplates: Provide with four beveled edges ANSI J102, 10 inches high by width less 2 inches on single doors and 1-inch on pairs of doors. Furnish oval-head countersunk screws to match finish.

F. Door Bolts: Flush bolts for wood or metal doors.

1. Provide a set of Automatic bolts, Certified ANSI/BHMA 156.3 Type 25 for hollow metal label doors.
2. Provide a set of Automatic bolts, Certified ANSI/BHMA 156.3 Type 27 at wood label doors.
3. Manual flush bolts, Certified ANSI/BHMA 156.16 at openings where allowed local authority.
4. Provide Dust Proof Strike, Certified ANSI/BHMA 156.16 at doors with flush bolts without thresholds.

G. Weatherstripping: Provide at head and jambs only those units where resilient or flexible seal strip is easily replaceable. Where bar-type weatherstrip is used with parallel arm mounted closers install weatherstrip first.

1. Weatherstrip shall be resilient seal of (Neoprene, Polyurethane, Vinyl, Pile, Nylon Brush, Silicone).
2. UL10C Positive Pressure rated seal set when required.

H. Door Bottoms/Sweeps: Surface mounted or concealed door bottom where listed in the hardware sets.

1. Door seal shall be resilient seal of (Neoprene, Polyurethane, Nylon Brush, Silicone).
2. UL10C Positive Pressure rated seal set when required.

I. Thresholds: Thresholds shall be aluminum beveled type with maximum height of 1/2-inch for conformance with ADA requirements. Furnish thermal break thresholds as specified and per details. Mount thresholds with the thermal break centered under the door. Provide fasteners and screws suitable for floor conditions.

2.3 FINISH

A. Designations used in Schedule of Finish Hardware - 3.05, and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18 including coordination with traditional U.S. finishes shown by certain manufacturers for their products.

B. Powder coat door closers to match other hardware, unless otherwise noted.

C. Aluminum items shall be finished to match predominant adjacent material. Seals to coordinate with frame color.

2.4 KEYS AND KEYING

A. Provide keyed brass construction cores and keys during the construction period. Construction control and operating keys and core shall not be part of the Owner's

permanent keying system or furnished in the same keyway (or key section) as the Owner's permanent keying system. Permanent cores and keys (prepared according to the accepted keying schedule) will be furnished to the Owner.

B. Cylinders, removable and interchangeable core system: Best CORMAX™ Patented 7-pin.

C. Permanent keys and cores: Stamped with the applicable key mark for identification. These visual key control marks or codes will not include the actual key cuts. Permanent keys will also be stamped "Do Not Duplicate."

D. Transmit Grand Masterkeys, Masterkeys and other Security keys to Owner by Registered Mail, return receipt requested.

E. Furnish keys in the following quantities:

1. 1 each Grand Masterkeys.
2. 2 each Masterkeys.
3. 2 each Change keys each keyed core.
4. 5 each Construction masterkeys.
5. 1 each Control keys.

F. The Owner, or the Owner's agent, will install permanent cores and return the construction cores to the Hardware Supplier. Construction cores and keys remain the property of the Hardware Supplier.

G. Keying Schedule: Arrange for a keying meeting, and programming meeting with Architect Owner and hardware supplier, and other involved parties to ensure locksets and locking hardware, are functionally correct and keying and programming complies with project requirements. Furnish 3 typed copies of keying and programming schedule to Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of conditions: Examine doors, frames, related items and conditions under which Work is to be performed and identify conditions detrimental to proper and or timely completion.

1. Do not proceed until unsatisfactory conditions have been corrected.

3.2 HARDWARE LOCATIONS:

A. Mount hardware units at heights indicated in the following publications except as specifically indicated or required to comply with the governing regulations.

1. Recommended Locations for Builder’s Hardware for Standard Steel Doors and Frames, by the Door and Hardware Institute (DHI).
2. Recommended locations for Architectural Hardware for flush wood doors (DHI).

3. WDMA Industry Standard I.S.-1A-04, Industry Standard for Architectural wood flush doors.

3.3 INSTALLATION:

A. Install each hardware item per manufacturer's instructions and recommendations. Do not install surface mounted items until finishes have been completed on the substrate. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

B. Conform to local governing agency security ordinance.

C. Install Conforming to ICC/ANSI A117.1 Accessible and Usable Building and Facilities.

1. Adjust door closer sweep periods so that from the open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the landing side of the door.

D. Installed hardware using the manufacturers fasteners provided. Drill and tap all screw holes located in metallic materials. Do not use “Riv-Nuts” or similar products.

3.4 FIELD QUALITY CONTROL AND FINAL ADJUSTMENT

A. Contractor/Installers, Field Services: After installation is complete, contractor shall inspect the completed door openings on site to verify installation of hardware is complete and properly adjusted, in accordance with both the Contract Documents and final Shop Drawings.

1. Check and adjust closers to ensure proper operation.
2. Check latchset, lockset, and exit devices are properly installed and adjusted to ensure proper operation.

a. Verify levers are free from binding.
b. Ensure latchbolts and dead bolts are engaged into strike and hardware is functioning.

3. Report findings, in writing, to architect indicating that all hardware is installed and functioning properly. Include recommendations outlining corrective actions for improperly functioning hardware if required.

3.5 SCHEDULE OF FINISH HARDWARE:

HARDWARE SCHEDULE				
3	Hinges	FBB191 4 1/2 X 4 1/2	630	ST
1	Set Flush Bolts	1845	626	RO
1	Dust Proof Strike	570	626	RO
1	Lockset	45H-7D15M STD|PATD	626	BE
1	Closer	4040 XP REG	689	LC
1	Threshold	252 X 3 AFG	-	PE
1	Weather-strip	303 AS x Head & Jambs	-	PE
1	Door Bottom	315 CN	-	PE

Schedule Index:	
Finish List	
626	Satin Chromium Plated
630	Satin Stainless Steel
689	Aluminum Painted
Manufacturer List	
BE	Best Access Systems
LC	LCN Closers
PE	Pemko
RO	Rockwood
ST	Stanley

END OF SECTION 087100

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS (FC)

A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Ansul Incorporated; Tyco International.
b. JL Industries, Inc.; a division of the Activar Construction Products Group.
c. Kidde Residential and Commercial Division.
d. Larsens Manufacturing Company.

2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B**,** and bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging.

B. Multipurpose Dry-Chemical Type: UL-rated 10 pound nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.

2.3 MOUNTING BRACKETS (FC)

A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or black baked-enamel finish.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Ansul Incorporated; Tyco International.
b. JL Industries, Inc.; a division of the Activar Construction Products Group.
c. Larsens Manufacturing Company.

B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.

1. Mounting Brackets: 54 inches (1372 mm) above finished floor to top of fire extinguisher.

C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 104416

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SECTION 220513 - COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.2 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:

1. Motor controllers.
2. Torque, speed, and horsepower requirements of the load.
3. Ratings and characteristics of supply circuit and required control sequence.
4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

A. Comply with NEMA MG 1 unless otherwise indicated.

2.2 MOTOR CHARACTERISTICS

A. Duty: Continuous duty at ambient temperature of positive 40 deg C and at altitude of 3300 feet (1000 m) above sea level.

B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 SINGLE-PHASE MOTORS

A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:

1. Permanent-split capacitor.
2. Split phase.
3. Capacitor start, inductor run.
4. Capacitor start, capacitor run.

B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

D. Motors 1/20 HP and Smaller: Shaded-pole type.

E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Used)

END OF SECTION 220513

SECTION 220517 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves.
2. Sleeve-seal systems.

1.2 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 SLEEVES

A. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

2.2 SLEEVE-SEAL SYSTEMS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Metraflex Company (The).
2. Pipeline Seal and Insulator, Inc.
3. Proco Products, Inc.

B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.

1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Stainless steel.
3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch (25-mm) annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.3 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls below Grade:

a. Galvanized-steel-pipe sleeves with sleeve-seal system.

1) Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.

2. Concrete Slabs-on-Grade:

a. Galvanized-steel-pipe sleeves with sleeve-seal system.

1) Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.

END OF SECTION 220517

SECTION 220519 - METERS AND GAGES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Liquid-in-glass thermometers.
2. Thermowells.
3. Dial-type pressure gages.
4. Gage attachments.

1.2 ACTION SUBMITTALS

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

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 LIQUID-IN-GLASS THERMOMETERS

A. Metal-Case, Industrial-Style, Liquid-in-Glass Thermometers:

1. Standard: ASME B40.200.
2. Case: Cast aluminum; 9-inch (229-mm) nominal size unless otherwise indicated.
3. Case Form: Adjustable angle unless otherwise indicated.
4. Tube: Glass with magnifying lens and blue or red organic liquid.
5. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg F and deg C.
6. Window: Glass.
7. Stem: Aluminum and of length to suit installation.

    a. Design for Thermowell Installation: Bare stem.

8. Connector: 1-1/4 inches (32 mm), with ASME B1.1 screw threads.
9. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

2.2 THERMOWELLS

A. Thermowells:

1. Standard: ASME B40.200.
2. Description: Pressure-tight, socket-type fitting made for insertion into piping tee fitting.
3. Material for Use with Copper Tubing: CNR or CUNI.
4. Type: Stepped shank unless straight or tapered shank is indicated.
5. External Threads: NPS 1/2, NPS 3/4, or NPS 1, (DN 15, DN 20, or NPS 25,) ASME B1.20.1 pipe threads.
6. Internal Threads: 1/2-, 3/4-, and 1-inch (13-, 19-, and 25-mm), with ASME B1.1 screw threads.
7. Bore: Diameter required to match thermometer bulb or stem.
8. Insertion Length: Length required to match thermometer bulb or stem.
9. Lagging Extension: Include on thermowells for insulated piping and tubing.
10. Bushings: For converting size of thermowell's internal screw thread to size of thermometer connection.

B. Heat-Transfer Medium: Mixture of graphite and glycerin.

2.3 PRESSURE GAGES

A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gages:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Ametek U.S. Gauge.
    b. Trerice, H. O. Co.
    c. Weiss Instruments, Inc.
    d. Weksler Glass Thermometer Corp.

2. Standard: ASME B40.100.
3. Case: Sealed type(s); cast aluminum or drawn steel; 4-1/2-inch (114-mm) nominal diameter.
4. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
5. Pressure Connection: Brass, with NPS 1/4 (DN 8), ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
6. Movement: Mechanical, with link to pressure element and connection to pointer.
7. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi (kPa).
8. Pointer: Dark-colored metal.
9. Window: Glass.
10. Ring: Metal.
11. Accuracy: Grade C, plus or minus 3 percent of middle half of scale range.

2.4 GAGE ATTACHMENTS

A. Snubbers: ASME B40.100, brass; with NPS 1/4 (DN 8), ASME B1.20.1 pipe threads and piston or porous-metal-type surge-dampening device. Include extension for use on insulated piping.

B. Valves: Brass ball, with NPS 1/4 (DN 8), ASME B1.20.1 pipe threads.

2.5 METERING

A. Meters capable of the following:

1. Recording cumulative water consumption.
2. Communicating data remotely.

B. Meter the following:

1. Each building service.

2.6 WATER METERS

A. Manufacturers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Badger.
b. Neptune.
c. Zenner.

B. Displacement-Type Water Meters:

1. Description: With bronze main case.

a. Standard: AWWA C700.
b. Registration: Flow in gallons (liters).

2. Material:

a. Lead-Free per NSF-372.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install thermowells with socket extending one-third of pipe diameter and in vertical position in piping tees.

B. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.

C. Install thermowells with extension on insulated piping.

D. Fill thermowells with heat-transfer medium.

E. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.

F. Install remote-mounted thermometer bulbs in thermowells and install cases on panels; connect cases with tubing and support tubing to prevent kinks. Use minimum tubing length.

G. Install direct-mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.

H. Install valve and snubber in piping for each pressure gage for fluids.

I. Install thermometers in the following locations:

1. Inlet and outlet of each domestic storage tank.
2. At each building service.
3. As indicated on plans and details.

J. Install pressure gages in the following locations:

1. Building water service entrance into each building.
2. Suction and discharge of each domestic water pump.
3. As indicated on plans and details.

K. Adjust faces of meters and gages to proper angle for best visibility.

3.2 THERMOMETER SCHEDULE

A. Thermometers shall be the following:

1. Industrial-style, liquid-in-glass type.

B. Thermometer stems shall be of length to match thermowell insertion length.

3.3 THERMOMETER SCALE-RANGE SCHEDULE

A. Scale Range for Domestic Cold-Water Piping: 0 to 100 deg F (negative 20 to positive 50 deg C).

3.4 PRESSURE-GAGE SCHEDULE

A. Pressure gages at discharge of each water service into building shall be the following:

1. Sealed, direct-mounted, metal case.

B. Pressure gages at suction and discharge of each domestic water pump shall be the following:

1. Sealed, direct-mounted, metal case.

3.5 PRESSURE-GAGE SCALE-RANGE SCHEDULE

A. Scale Range for Water Service Piping and Pumps: 0 to 100 psi (0 to 600 kPa).

B. Scale Range for Water Circulation Pump: 0 to 30 psi (0 to 200 kPa).

3.6 WATER METER INSTALLATION

A. Install water meters, piping, and specialties according to manufacturer's written instructions.

B. Water Meters: Install water meters, NPS 2 (DN 50) and smaller, with shutoff valves on water meter inlets. Include valves on water meter outlets.

END OF SECTION 220519

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SECTION 220523 - GENERAL VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Bronze ball valves.
2. Bronze swing check valves.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of valve.

1. Certification that products comply with NSF 61 Annex G and NSF 372.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B1.20.1 for threads for threaded end valves.
2. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
3. ASME B16.18 for solder-joint connections.
4. ASME B31.9 for building services piping valves.

C. NSF Compliance: NSF 61 Annex G and NSF 372 for valve materials for potable-water service.

D. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.

E. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

F. Valve Sizes: Same as upstream piping unless otherwise indicated.

G. Valve Actuator Types:

1. Handlever: For quarter-turn valves smaller than NPS 4 (DN 100).

H. Valves in Insulated Piping:

1. Include 2-inch (50-mm) stem extensions.
2. Extended operating handles of nonthermal-conductive material and protective sleeves that allow operation of valves without breaking vapor seals or disturbing insulation.
3. Memory stops that are fully adjustable after insulation is applied.

2.2 BRONZE BALL VALVES

A. Two-Piece, Bronze Ball Valves with Full Port, and Bronze or Brass Trim:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Crane; Crane Energy Flow Solutions.
b. Milwaukee Valve Company.
c. NIBCO INC.

2. Description:

a. Standard: MSS SP-110.
b. CWP Rating: 600 psig (4140 kPa).
c. Body Design: Two piece.
d. Body Material: Bronze.
e. Ends: Threaded and soldered.
f. Seats: PTFE.
g. Stem: Bronze or brass.
h. Ball: Chrome-plated brass.
i. Port: Full.

2.3 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Nonmetallic Disc:

1. Description:

a. Standard: MSS SP-80, Type 4.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Design: Horizontal flow.
d. Body Material: ASTM B 62, bronze.
e. Ends: Threaded or soldered. See valve schedule articles.
f. Disc: PTFE.

PART 3 - EXECUTION

3.1 GENERAL VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

3.2 BALL VALVE INSTALLATION

A. Install valves in position to allow full stem movement.

3.3 CHECK VALVE INSTALLATION

A. Install valves in position to allow full stem movement.

B. Install swing check valves for proper direction of flow in horizontal position with hinge pin level.

3.4 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.5 GENERAL REQUIREMENTS FOR BALL VALVE APPLICATIONS

A. If valves with specified CWP ratings are unavailable, the same types of valves with higher CWP ratings may be substituted.

B. Select valves with the following end connections:

1. For Copper Tubing, NPS 2 (DN 50) and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.

3.6 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 (DN 50) and Smaller:

1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
2. Two-piece, bronze ball valves with full port and bronze or brass trim.

3.7 GENERAL REQUIREMENTS FOR CHECK VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Pump-Discharge Check Valves:

a. NPS 2 (DN 50) and Smaller: Bronze swing check valves with nonmetallic disc.

B. If valves with specified CWP ratings are unavailable, the same types of valves with higher CWP ratings may be substituted.

C. End Connections:

1. For Copper Tubing, NPS 2 (DN 50) and Smaller: Threaded or soldered.

3.8 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 (DN 50) and Smaller: Bronze swing check valves, Class 125, nonmetallic disc with soldered or threaded end connections.

END OF SECTION 220523

SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Thermal-hanger shield inserts.
4. Fastener systems.
5. Equipment supports.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Design seismic-restraint hangers and supports for piping and equipment.

1.3 ACTION SUBMITTALS

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

B. Shop Drawings: Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Trapeze pipe hangers.
2. Equipment supports.

C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.5 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 THERMAL-HANGER SHIELD INSERTS

A. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig (688-kPa) minimum compressive strength and vapor barrier.

B. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

C. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

D. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

2.4 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.5 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.6 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, non-shrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

D. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches (100 mm) thick in concrete after concrete is placed and

completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.

2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

E. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

F. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

G. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

H. Install lateral bracing with pipe hangers and supports to prevent swaying.

I. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 (DN 65) and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

J. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

K. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

L. Insulated Piping:

1. Attach clamps and spacers to piping.

    a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
    b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
    c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

    a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

4. Shield Dimensions for Pipe: Not less than the following:

   a. NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90): 12 inches (305 mm) long and 0.048-inch (1.22-mm) thick.

5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches (40 mm).

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils (0.05 mm).

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports and metal trapeze pipe hangers and attachments for general service applications.

F. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.

G. Use padded hangers for piping that is subject to scratching.

H. Use thermal-hanger shield inserts for insulated piping and tubing.

I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
2. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
3. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).

J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24 (DN 24 to DN 600).

K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.

L. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.

M. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
2. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

N. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

O. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 220529

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SECTION 220533 - HEAT TRACING FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes plumbing piping heat tracing for freeze prevention with the following electric heating cables:

1. Self-regulating, parallel resistance.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For electric heating cable.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Sample Warranty: For special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace electric heating cable that fails in materials or workmanship within specified warranty period.

1. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SELF-REGULATING, PARALLEL-RESISTANCE HEATING CABLES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Chromalox.
2. Nelson Heat Trace; a division of EGS Electrical Group LLC.
3. Raychem; a brand of Tyco Thermal Controls LLC.

B. Comply with IEEE 515.1.

C. Heating Element: Pair of parallel No. 16 AWG, tinned, or stranded copper bus wires embedded in crosslinked conductive polymer core, which varies heat output in

response to temperature along its length. Terminate with waterproof, factory-assembled, nonheating leads with connectors at one end, and seal the opposite end watertight. Cable shall be capable of crossing over itself once without overheating.

D. Electrical Insulating Jacket: Flame-retardant polyolefin.

E. Cable Cover: Fabricated of cross-linked, modified, polyolefin dielectric jacked; tinned-copper braid; and polyolefin outer jacket with ultraviolet inhibitor.

F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

G. Heat Output: At least 90 percent of rating over a temperature range from 40 to 150 deg F pipe temperature. Cables shall be rated 8 W/LF at 240V AC.

2.2 ACCESSORIES

A. Cable Installation Accessories: Fiberglass tape, heat-conductive putty, cable ties, silicone end seals and splice kits, and installation clips all furnished by manufacturer, or as recommended in writing by manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install electric heating cable across expansion, construction, and control joints according to manufacturer's written instructions; use cable-protection conduit and slack cable to allow movement without damage to cable.

B. Electric Heating-Cable Installation for Freeze Protection for Piping:

1. Install electric heating cables after piping has been tested and before insulation is installed.
2. Install electric heating cables according to IEEE 515.1.
3. Install insulation over piping with electric cables according to Section 220719 "Plumbing Piping Insulation."
4. Install warning tape on piping insulation where piping is equipped with electric heating cables.

C. Set field-adjustable switches and circuit-breaker trip ranges.

D. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

E. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.2 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Perform tests after cable installation but before application of coverings such as insulation, wall or ceiling construction, or concrete.
2. Test cables for electrical continuity and insulation integrity before energizing.
3. Test cables to verify rating and power input. Energize and measure voltage and current simultaneously.

B. Repeat tests for continuity, insulation resistance, and input power after applying thermal insulation on pipe-mounted cables.

C. Cables will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

E. Remove and replace damaged heat-tracing cables.

END OF SECTION 220533

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SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Pipe labels.
3. Valve tags.

1.2 ACTION SUBMITTALS

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

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Plastic Labels for Equipment:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. Brimar Industries, Inc.
   b. Craftmark Pipe Markers.
   c. Seton Identification Products.

2. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16-inch (1.6-mm) thick, and having predrilled holes for attachment hardware.
3. Letter Color: White.
4. Background Color: Black.
5. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).
6. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2-by-3/4-inch (64-by-19-mm).

7. Minimum Letter Size: 1/4-inch (6.4-mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2-inch (13-mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
8. Fasteners: Stainless-steel rivets or self-tapping screws.
9. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number.

C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by 11-inch (A4) bond paper. Tabulate equipment identification number, and identify Drawing numbers where equipment is indicated (plans, details, and schedules). Equipment schedule shall be included in operation and maintenance data.

2.2 PIPE LABELS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Brimar Industries, Inc.
2. Craftmark Pipe Markers.
3. Seton Identification Products.

B. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include pipe size and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping-system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1/2-inch (13-mm) for viewing distances up to 72 inches (1830 mm) and proportionately larger lettering for greater viewing distances.

2.3 VALVE TAGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Brimar Industries, Inc.
2. Craftmark Pipe Markers.

3. Seton Identification Products.

B. Valve Tags: Stamped or engraved with 1/4-inch (6.4-mm) letters for piping system abbreviation and 1/2-inch (13-mm) numbers.

1. Tag Material: Brass, 0.032-inch (0.8-mm) or stainless steel, 0.025-inch (0.64-mm) minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass wire-link chain or beaded chain.

C. Valve Schedules: For each piping system, on 8-1/2-by 11-inch (A4) bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.3 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.4 PIPE LABEL INSTALLATION

A. Pipe Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.

3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 25 feet along each run. Reduce intervals to 10 feet in areas of congested piping and equipment.

B. Directional Flow Arrows: Arrows shall be used to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.

C. Pipe Label Color Schedule:

1. Domestic Water Piping

a. Background: Safety green.
b. Letter Colors: White.

2. Fuel Oil Piping

a. Background: Safety yellow.
b. Letter Colors: Black.

3.5 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, shutoff valves, faucets, convenience and lawn-watering hose connections, and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:

a. Cold Water: 2 inches (50 mm), round.

2. Valve-Tag Colors:

a. Cold Water: Natural.

3. Letter Colors:

a. Cold Water: White or Natural.

END OF SECTION 220553

SECTION 220719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes insulating the following plumbing piping services:

1. Domestic cold-water piping.

1.2 ACTION SUBMITTALS

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

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

B. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Supply and Drain Protective Shielding Guards: ICC A117.1.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Mineral-Fiber, Preformed Pipe Insulation:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Johns Manville; a Berkshire Hathaway company.
b. Knauf Insulation.
c. Owens Corning.

2. Type I, 850 Deg F (454 Deg C) Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ.

2.2 INSULATING CEMENTS

A. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

C. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

D. PVC Jacket Adhesive: Compatible with PVC jacket.

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. Mastics: As recommended by insulation manufacturer and with a VOC content of 50 g/L or less.

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.

1. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm (0.009 metric perm) at 43-mil (1.09-mm) dry film thickness.
2. Service Temperature Range: Negative 20 to positive 180 deg F (Negative 29 to positive 82 deg C).
3. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
4. Color: White.

2.5 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:

1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Negative 40 to positive 250 deg F (Negative 40 to positive 121 deg C).
4. Color: Aluminum.

B. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Negative 40 to positive 250 deg F (Negative 40 to positive 121 deg C).
4. Color: White.

2.6 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.

2.7 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Adhesive: As recommended by jacket material manufacturer.
2. Color: White.
3. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.

a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

2.8 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Width: 3 inches (75 mm).

2. Thickness: 11.5 mils (0.29 mm).
3. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
4. Elongation: 2 percent.
5. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Width: 2 inches (50 mm).
2. Thickness: 6 mils (0.15 mm).
3. Adhesion: 64 ounces force/inch (0.7 N/mm) in width.
4. Elongation: 500 percent.
5. Tensile Strength: 18 lbf/inch (3.3 N/mm) in width.

2.9 SECUREMENTS

A. Aluminum Bands: ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020-inch (0.51-mm) thick, 1/2-inch (13-mm) wide with wing seal.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch- (19-mm-) wide, stainless steel or Monel.

C. Wire: 0.062-inch (1.6-mm) soft-annealed, stainless steel.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- (75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches (100 mm) o.c.

    a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Cleanouts.

3.3 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches (50 mm) below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

1. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
2. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.

3.4 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

C. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches (50 mm) over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

3.5 INSTALLATION OF MINERAL-FIBER PREFORMED PIPE INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples at 6 inches (150 mm) o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

C. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

D. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

3.6 FIELD-APPLIED JACKET INSTALLATION

A. Where PVC jackets are indicated, install with 1-inch (25-mm) overlap at longitudinal seams and end joints. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

3.7 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below:

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

C. Do not field paint aluminum or stainless-steel jackets.

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to two locations of straight pipe, two locations of threaded fittings, two locations of soldered fittings, one locations of threaded strainers, one locations of threaded valves, and one locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.9 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.10 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold, Recirculated Cold Water, and Non-Potable Water: Insulation shall be the following:

1. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2-inch (13-mm) thick.

3.11 INDOOR, FIELD-APPLIED FINISH SCHEDULE

A. Piping, Exposed:

1. Painted.

B. Piping, Exposed to damage or traffic, within 5 feet of floor:

1. PVC: 30 mils (0.8 mm) thick.

END OF SECTION 220719

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SECTION 221113 - FACILITY WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The Work covered by these Specifications consists of providing all labor, equipment, supplies, material, transportation, handling and storage, and performing all operations necessary to complete the construction of all water facilities including arctic pipe ducts, water service piping and water vaults.

1.2 RELATED SECTIONS

A. Division 01 Section for quality requirements.

B. Section 312000 “Earth Moving.”

C. Section 329000 “Landscaping.”

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM).

B. American Water Works Association (AWWA).

C. Uniform Plumbing Code (UPC).

1.4 SURVEY

A. The Contractor’s surveyor shall lay out in the field the alignment and grade for Work to be done under the Contract. When laid out, the Contractor shall be responsible for the preservation of all line stakes, grade stakes, and hubs.

B. As-built measurement and Drawings will be maintained daily by the Contractor on all fittings, grade breaks and utility crossings. The Contractor shall, prior to Final Acceptance, provide the Owner's Representative with clean record Drawings.

1.5 SUBMITTALS

A. Submit Manufacturer’s Product Data under provisions of Division 01, including pipe and pipe accessories.

B. Submit Shop Drawings under provisions of Division 01.

C. Submit manufacturer’s installation instructions under provisions of Division 01.

1.6 PROJECT RECORD DOCUMENTS

A. Contractor will maintain and submit as-built drawings of water system installation information. Final as-built drawings require the stamp of a professional engineer registered in the State of Alaska. Accurately record location of pipe runs and the location and invert elevations of valves, curb stops, corporation stops, air relief valves and fittings. Locations shall be established with two (2) swing-tie distances to permanent structures and tied to property corners if available. Also identify and describe unexpected variations of subsoil conditions or discovery of uncharted utilities.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

B. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

C. Protect flanges, fittings, and specialties from moisture and dirt.

PART 2 - MATERIALS

2.1 PIPING

A. All piping shall be insulated according to the Contract Documents conforming to the size and class shown and specified.

B. All piping, flux, and solder shall be lead-free. Additionally, all materials in contact with potable water shall be NSF 60/61 listed for that purpose.

C. High Density Polyethylene Pipe (HDPE) and Fittings: The pipe and fitting material shall have a cell classification of 345434C in accordance with ASTM D3350. The pipe shall be extruded from a resin listed by the National Sanitation Foundation, the Plastic Pipe Institute (PPI), and produced in accordance with applicable ASTM standards. The material shall be listed by the PPI. All HDPE pipe shall conform to standard iron pipe size outside dimensions (IPS).

1. Acceptable pipe resin and dimension ratios are:

a. PE 3608 DR 11 @ 160 psi.
b. PE 4710 DR 13.5 @ 160 psi.
c. PE 3608 DR 17 @100 psi (Arctic Pipe Duct Only).

D. The pipe and fittings shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions or other harmful defects. They shall be capable of withstanding the cyclic freezing of water under their rated service pressure without breaks, leaks, gross deformities or impairing service characteristics. It shall be uniform in color, opacity, density and other physical properties.

E. Fittings shall be manufactured under factory-controlled conditions from molded HDPE of the same material characteristics as the pipe. Fittings shall have a minimum pressure rating of 160 psi.

F. Water pipe shall be jointed together by butt-welding, mechanical couplings, or electrofusion couplings. Method of jointing shall provide for thrust restraint at the full test pressure of the pipe. External thrust blocks are not acceptable.

1. Butt fusion of the pipe and fittings shall be performed in accordance with the pipe manufacturer's recommendations as to equipment and technique. The fusion operation shall be performed by an individual who has demonstrated the ability to fuse polyethylene pipe in the manner recommended by the pipe supplier. The pipe supplier shall supply a representative to instruct the Contractor's crew on butt fusion and installation and witness the first twenty (20) joints.
2. Mechanical couplings will be permitted only as shown on the Drawings and/or as authorized by the Engineer.
3. Electrofusion couplings shall be constructed of HDPE material compatible with the supplied HDPE pipe. The coupling shall be constructed with a self-regulating fusion process system to control the heat welding process. The welding procedure and equipment shall be shall be in strict accordance with the manufacturer’s recommendations. Use of electrofusion couplings shall be limited to use at special fittings, final connections, and joints where butt fusion or a mechanical joint is not possible. Use of electrofusion couplings shall be approved by the engineer. Two swing ties shall be recorded on as-built drawings for each electrofusion coupling installed.

G. Water lines less than 2-inch diameter located within ducts or larger pipes shall be continuous end to end with no joints.

H. Pipe and Fitting Insulation: The insulation installed between the inner core (carrier pipe) and outer jacket shall be low-density rigid closed-cell polyurethane foam with a minimum thickness as shown on the Drawings. It shall be applied and cured in strict accordance with the manufacturer's recommendations and good commercial practices such that the resulting cellular insulation completely fills the annular space between inner pipe and outer jacket. The insulation shall be free of defects affecting its intended use. The exterior of the inner core (carrier) pipe shall be prepared by shotblasting, or other approved method, to a maximum depth of 0.002 inches (0.0508 mm), to ensure adhesion of the foam insulation to the pipe.

1. The polyurethane foam shall be according to the requirements of ASTM D2341 cell classification 550674970034. Unless otherwise referenced below, insulation sample conditioning, test temperature, and relative humidity conditions shall be per ASTM D2341. Other requirements shall be as follows:

a. Molded core density range, ASTM D1622 3.0 to 4.0 lb./F.
b. Minimum compressive strength, ASTM D1621, 35 psi.
c. Minimum closed cell content (porosity), ASTM D2856, 90 percent.
d. Maximum water absorption, permeability, ASTM D284, 20.05 lb./Ft2.
e. Maximum water vapor permeability, ASTM E96, 5.0 lb./Ft2.

f. Maximum K-factor as received by the purchaser ASTM C518, 0.165 BTU-
or C177 inch/hr/Ft^2 F.
g. Dimensional Stability (ASTM D2126) (Maximum Linear Change) 1 percent
(at negative 20 deg F) 3 percent (at positive 100 deg F).

2. Exposed faces of polyurethane foam at pipe ends shall be coated to protect against physical abuse and ultra-violet attack during shipping and storage and against water intrusion in service. The coating shall be an asphaltic-based sealant, specifically formulated by the manufacturer for direct application over urethane foam insulation and for long-term service and retained flexibility over extended periods of exposure to sunlight, harsh weather, and salt-water spray. It shall be applied and cured in strict accordance with the manufacturer's recommendations and good commercial practice such that the finished product is free of defects affecting its intended purpose. The coating shall be capable of field application with a brush for touch-up of shipping damage and recoating field cut piping.

I. Outer Jacket: The outer jacket for the insulated pipe may be spiral rib pipe (SRP) or corrugated metal pipe (CMP), suitable for both direct burial and above grade use, including traffic loading where buried under a minimum of 18 inches (458 mm) of soil.

1. The jacket material shall be constructed of 16-gauge (min.) helical aluminum pipe. All helical seams shall be continuous, tightly locked, folded, and watertight (no leakage) under a 5-foot head of water. The aluminum alloy shall conform to the current AASHTO M-196 specification.

J. Jacket Joints: jacketed pipe to pipe and pipe to fitting joints shall be insulated with polyurethane foam by tight fitting half shells or by uniform field application. SRP or CMP jacketed joints shall be insulated and banded with aluminum bands using gaskets or other approved method to make the joints water-tight; no leakage under a 5-foot head of water. Aluminous bands shall be in accordance with the provided details or as approved by the Engineer. Hardware, including bolts shall be stainless steel, provide anti-seize thread compound on all threaded fasteners.

2.2 WATER VAULTS

A. Standard Precast Concrete Manholes:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Diameter: 48 inches (1220 mm) minimum unless otherwise indicated.
3. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
4. Base Section: 6-inch (150-mm) minimum thickness for floor slab and 4-inch (100-mm) minimum thickness for walls; base section to have integral floor.
5. Riser Sections: 4-inch (100-mm) minimum thickness, of length to provide depth indicated.
6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated; with top of cone of size that matches grade rings.
7. Joint Sealant: ASTM C 990, bitumen or butyl rubber.

8. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.
9. Steps: Individual FRP steps, FRP ladder, or ASTM A 615, deformed, 1/2-inch (13-mm) steel reinforcing rods encased in ASTM D 4101, PP; wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches.
10. Grade Rings: Reinforced-concrete rings, 3- to 9-inch (70- to 230-mm) total thickness, with diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope.

B. Manhole Frames and Covers:

1. Description: Ferrous; 24-inch ID by 7- to 9-inch (180- to 230-mm) riser, with 4-inch (100-mm) minimum-width flange and 26-inch diameter cover. Frame and cover to be rated Heavy Duty (H-20 loading minimum). Include indented top design with lettering cast into cover, using wording “WATER".
2. Material: ASTM A 48, Class 35 gray iron unless otherwise indicated.

C. Manhole Insulation:

1. Manhole to be insulated with urethane spray foam insulation as indicated on the Drawings. Manholes to be completely wrapped with three (3) layers of 6 mil polyethylene sheeting.

2.3 DISINFECTING MEDIUM

A. Calcium Hypochlorite with 70 percent available chlorine, "H.T.H." or pre-approved equal.

PART 3 - EXECUTION

3.1 CONSTRUCTION

A. Excavation and Backfill: The Contractor shall provide all excavation and backfill, and compaction necessary to install pipe and manholes.

B. Materials Delivery: Pipe and appurtenances shall be handled in such a manner as to insure delivery to the trench in a sound, undamaged condition. Particular care shall be taken not to damage the pipe, pipe jacket, or insulation. Before installation, the pipe and appurtenances shall be examined by the Engineer for defects.

C. Installation: Installation shall be in accordance with the requirements of ANSI/AWWA C901 and C906. The interior of the pipe and fittings shall be thoroughly cleaned of foreign material just prior to joining. The method of cleaning shall be approved by the Engineer. The open end of the pipe shall be kept clean during laying operation by plugging. The pipe shall be mechanically capped to deter vandalism.

1. Pipe and appurtenances shall be carefully lowered into the trench or positioned on timber support by means of derrick, ropes, belt slings, or other suitable equipment. Under no circumstances shall any of the pipe or appurtenances be dropped or dumped during installation. Care shall be taken to avoid abrasion or damage to the pipe ends or jacket.
2. The trench bottom shall be graded to provide uniform support for the pipe barrel. Water shall be kept out of the trench by pumping, if necessary, until the jointing is completed. When Work is not in progress, open ends of the pipe, fittings, and valves shall be securely plugged so that no trench water, earth or other substances will enter the pipes or fittings. Where any part of the arctic pipe unit is damaged, the repair shall be made by the Contractor at his expense and in a manner satisfactory to the Engineer. At a sufficient distance, prior to encountering a known obstacle or tying into an existing pipe, the Contractor shall expose and verify the exact location of the obstacle or pipe so that proper alignment and/or grade may be determined before the pipe sections are laid in the trench and backfilled.

D. Cutting of pipe shall be done in a neat and workmanlike manner without damage to the pipe. All pipe and fitting shall be installed with the heat trace channel “up” or as shown on the Drawings.

E. Alignment and Grade: The pipe shall be laid such that after the line is completed, the bottom of the pipe conforms accurately to the grades and alignment given by the Engineer. A maximum two-tenths (2/10) foot deviation from design elevation and alignment will be allowed. The pipe shall be generally straight to visual observation as determined by the Engineer.

1. Both line and grade shall be checked and recorded in a field book for each piece of pipe and appurtenances laid. The Contractor shall have instruments such as a transit and level for transferring alignment and grades from offset hubs. He also shall have in his employ a person who is qualified to use such instruments and who shall have the responsibility of placing and maintaining such construction guides. The Contractor will furnish to the Engineer a copy of the surveyor's notes for the newly installed pipe and appurtenances.
2. All adjustments to line and grade shall be done by scraping away or filling the earth under the body of the pipe and not by blocking or wedging up. Deflections from a straight line or grade, as required by vertical curves, horizontal curves, or offsets shall not exceed the manufacturer's recommendations.
3. If the alignment requires deflection in excess of the above limitations, the Contractor shall furnish special bends to provide angular deflections within the limits allowable. Short-radius curves and closures shall be formed by shorter lengths of pipe, bevels, or fabricated specials.

F. Jointing of Pipe: All joints shall be butt-welded. Mechanical couplings will be permitted where designated in the Contract Documents or authorized by the Engineer.

1. Provide electrical heat trace in ducts or on piping as shown in the Drawings. Place junction boxes, end seals, and heat tracing appurtenances in accessible locations, but protected from damage.

3.2 FLUSHING AND TESTING

A. Prior to any tests performed, all newly installed water facilities shall be open-bore flushed. Disinfection will not be allowed until all open-bore flush pipes are removed and the water system is sealed.

B. Run water in open-bore flush until clear.

3.3 HYDROSTATIC TESTING

A. A hydrostatic test shall be conducted on all newly constructed water mains, or water services.

B. The Contractor shall furnish all necessary assistance, equipment, labor, materials, and supplies necessary to complete the test to the satisfaction of the Engineer. The Contractor shall suitably valve-off or plug the outlet to the existing or previously-tested water line at his expense, prior to making the required hydrostatic test. Prior to testing, all air shall be expelled from the pipe. If permanent air vents are not located at all high points, the Contractor shall, at his expense, install corporation cocks at such points so the air can be expelled as the line is slowly filled with water.

C. All valves, pipe, fittings, and plugs shall be tested. All intermediate valves within the section being tested will be closed and reopened as directed by the Engineer during the actual test. Only static pressure will be allowed on the opposite side of the end valves of the section being tested.

D. All hydrostatic testing will be performed through test and air copper pipe. Use of fire hydrant and service connections for testing will not be allowed.

E. The hydrostatic pressure shall be 160 psi or 1.5 times the rated operating pressure of the pipe, whichever is less. The duration of each hydrostatic pressure test, after stabilization, shall be a minimum of 1 hour. After the required test pressure has been reached, the pumping will be terminated and the line will undergo a temperature stabilization period which will take 2 to 3 hours. Once the pressure has stabilized, then the pressure shall be brought back up to the test pressure to begin the 1-hour test. During the 1-hour test the pressure shall not be allowed to fall below 95 percent of the test pressure. If the test pressure drops to 95 percent (152 psi for a 160 psi test pressure) then the pump shall be turned on and the pressure brought back up to the test pressure. This procedure shall continue, as needed, during the test period. At the end of the test period the pressure shall be brought to the test pressure and the total amount of make-up water used during the test shall be measured. If the amount of make-up water does not exceed the amount allowed for pipe expansion shown in the

following table, then that section of line will not be subject to any future hydrostatic testing.

3.4 ALLOWANCE FOR EXPANSION UNDER TEST

(U.S. Gallons per 100 feet of Pipe)

Pipe Size	1 Hour Test	2 Hour Test	3 Hour Test
1-inch	0.05	0.10	0.15
4-inch	0.13	0.25	0.40
6-inch	0.30	0.60	0.90
8-inch	0.50	1.00	1.50

A. If the initial hydrostatic pressure test fails on any section, the Contractor has the option to perform one retest on that section. If the retest also fails then the Contractor, at no expense to the Owner, will determine the cause of the failure, repair the line and retest.

B. After completion of testing, all test and air vent copper pipe shall be removed and the stop closed at the main, in the presence of the Engineer.

3.5 DISINFECTION OF POTABLE WATER LINES

A. After entire system has been pressure tested, disinfect all new work and all portions of the system that may have become contaminated due to work under this contract.

B. Mix disinfecting medium to produce a 5 percent solution, based on weight. Mix first into a paste and then thin to the final dilution. Inject sufficient mixture to insure a dosage of chlorine at 50 parts per million (10 ounces of powder to 1000 gal.).

C. Treat all affected system with the mixture, open all taps and valves until a strong odor of chlorine is noticeable in water coming from outlets; close all valves.

D. Chlorinated water shall remain in the system for a minimum of 24 hours. During this period operate stops, valves, and other appurtenances to complete disinfection. Following this period, flush system with water. Water containing high amounts of disinfecting agent and from system flushing shall be disposed of in accordance with ADEC regulations. Provide erosion and sedimentation control in the area of the discharge.

E. After flushing is completed, take samples from representative points in the system, as selected by the Engineer, and place in sterile bottles. Submit bottles to the Contractor's Testing Laboratory for testing. Repeat disinfection process until satisfactory results are obtained. Two tests shall be taken 24 hours apart and tested for total coliform and e-coli. Do not put system into operation until both tests pass.

F. Remove special fittings required to perform the tests.

G. Submit test lab report to Owner under provisions of Division 01.

END OF SECTION 221113

SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes under-building-slab and aboveground domestic water pipes, tubes, and fittings inside buildings.

1.2 ACTION SUBMITTALS

A. Product Data: For transition fittings and dielectric fittings.

1.3 INFORMATIONAL SUBMITTALS

A. System purging and disinfecting activities report.

B. Field quality-control reports.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

B. Potable-water piping and components shall comply with NSF 14 and NSF 61 Annex G. Plastic piping components shall be marked with "NSF-pw."

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type L (ASTM B 88M, Type B) water tube, drawn temper.

B. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.

C. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

D. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.

E. Copper Unions:

1. MSS SP-123.
2. Cast-copper-alloy, hexagonal-stock body.
3. Ball-and-socket, metal-to-metal seating surfaces.
4. Solder-joint or threaded ends.

2.3 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials:

1. AWWA C110/A21.10, rubber, flat face, 1/8-inch (3.2-mm) thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.
2. Full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys.

D. Flux: ASTM B 813, water flushable.

2.4 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Jomar Valve.
2. Watts; a Watts Water Technologies company.
3. Zurn Industries, LLC.

C. Dielectric Unions:

1. Standard: ASSE 1079.
2. Pressure Rating: 125 psig (860 kPa) minimum at 180 deg F (82 deg C).
3. End Connections: Solder-joint copper alloy and threaded ferrous.

D. Dielectric Flanges:

1. Standard: ASSE 1079.
2. Factory-fabricated, bolted, companion-flange assembly.
3. Pressure Rating: 125 psig (860 kPa) minimum at 180 deg F (82 deg C).
4. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

E. Dielectric Nipples:

1. Standard: IAPMO PS 66.
2. Electroplated steel nipple complying with ASTM F 1545.
3. Pressure Rating and Temperature: 300 psig (2070 kPa) at 225 deg F (107 deg C).
4. End Connections: Male threaded or grooved.

5. Lining: Inert and noncorrosive, propylene.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Comply with requirements in Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination Drawings.

B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.

D. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance. Comply with requirements for pressure gages in Section 220519 "Meters and Gages for Plumbing Piping" and with requirements for drain valves and strainers in Section 221119 "Domestic Water Piping Specialties."

E. Install shutoff valve immediately upstream of each dielectric fitting.

F. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.

G. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

H. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices in Section 220529 "Hangars and Supports for Plumbing Piping and Equipment."

I. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

J. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

K. Install piping to permit valve servicing.

L. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

M. Install piping free of sags and bends.

N. Install fittings for changes in direction and branch connections.

O. Install PEX piping with loop at each change of direction of more than 90 degrees.

P. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

Q. Install pressure gages on suction and discharge piping for each plumbing pump and packaged booster pump. Comply with requirements for pressure gages in Section 220519 "Meters and Gages for Plumbing Piping."

R. Install thermostats in hot-water circulation piping. Comply with requirements for thermostats in Section 221123 "Domestic Water Pumps."

S. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

T. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

U. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.3 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

E. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.

F. Joint Construction for Solvent-Cemented Plastic Piping: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements. Apply primer.
2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
3. PVC Piping: Join according to ASTM D 2855.

G. Joints for PEX Piping: Join according to ASTM F 1807.

H. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.4 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Underground Domestic Water Piping:

1. Fittings for NPS 1-1/2 (DN 40) and Smaller: Fitting-type coupling.
2. Fittings for NPS 2 (DN 50) and Larger: Sleeve-type coupling.

C. Transition Fittings in Aboveground Domestic Water Piping NPS 2 (DN 50) and Smaller: Plastic-to-metal transition fittings or unions.

3.5 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 (DN 50) and Smaller: Use dielectric nipples or unions.

3.6 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices in Section 220529 "Hangars and Supports for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger, support products, and installation in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:

a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.

3. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8-inch (10-mm).

E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 (DN 20) and Smaller: 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
2. NPS 1 and NPS 1-1/4 (DN 25 and DN 32): 72 inches (1800 mm) with 3/8-inch (10-mm) rod.
3. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 96 inches (2400 mm) with 3/8-inch (10-mm) rod.

F. Install supports for vertical copper tubing every 10 feet (3 m).

G. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4 (DN 32) and Smaller: 84 inches (2100 mm) with 3/8-inch (10-mm) rod.
2. NPS 1-1/2 (DN 40): 108 inches (2700 mm) with 3/8-inch (10-mm) rod.
3. NPS 2 (DN 50): 10 feet (3 m) with 3/8-inch (10-mm) rod.

H. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Domestic Water Booster Pumps: Cold-water suction and discharge piping.
2. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 (DN 65) and larger.

3.8 IDENTIFICATION

A. Identify system components. Comply with requirements for identification materials and installation in Section 220553 "Identification for Plumbing Piping and Equipment."

B. Label pressure piping with system operating pressure.

3.9 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Piping Inspections:

a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.

c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

2. Piping Tests:

a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
d. Cap and subject piping to static water pressure of 50 psig (345 kPa) above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
f. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.10 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

    a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
    b. Adjust calibrated balancing valves to flows indicated.

5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.11 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Fill and isolate system according to either of the following:

        1) Fill system or part thereof with water/chlorine solution with at least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow to stand for 24 hours.
        2) Fill system or part thereof with water/chlorine solution with at least 200 ppm (200 mg/L) of chlorine. Isolate and allow to stand for three hours.

    c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    d. Repeat procedures if biological examination shows contamination.
    e. Submit water samples in sterile bottles to authorities having jurisdiction.

B. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.12 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.

D. Aboveground domestic water piping, NPS 2 (DN 50) and smaller, shall be the following:

1. Hard copper tube, ASTM B 88, Type L (ASTM B 88M, Type B); cast- or wrought-copper, solder-joint fittings; and soldered joints.

END OF SECTION 221116

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SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Vacuum breakers.
2. Backflow preventers.
3. Balancing valves.
4. Strainers.
5. Hose bibbs.
6. Drain valves.
7. Water-hammer arresters.

B. Related Requirements:

1. Section 220519 "Meters and Gages for Plumbing Piping" for thermometers, pressure gages, and flow meters in domestic water piping.
2. Section 221116 "Domestic Water Piping" for water meters.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

A. Potable-water piping and components shall comply with NSF 61 Annex G and NSF 14. Mark "NSF-pw" on plastic piping components.

2.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig (860 kPa) unless otherwise indicated.

2.3 VACUUM BREAKERS

A. Hose-Connection Vacuum Breakers:

1. Standard: ASSE 1011.
2. Body: Bronze, nonremovable, with manual drain.
3. Outlet Connection: Garden-hose threaded complying with ASME B1.20.7.

2.4 BACKFLOW PREVENTERS

A. Reduced-Pressure-Principle Backflow Preventers:

1. Standard: ASSE 1013.
2. Operation: Continuous-pressure applications.
3. Pressure Loss: 15 psig (83 kPa) maximum, through middle third of flow range.
4. Size: 1-1/2 inch.
5. Design Flow Rate: 30 gpm.
6. Selected Unit Flow Range Limits: 0-120 gpm.
7. Pressure Loss at Design Flow Rate: 15 psig.
8. Body: Bronze for NPS 2 (DN 50) and smaller.
9. End Connections: Threaded for NPS 2 (DN 50) and smaller.
10. Configuration: Designed for horizontal, straight-through flow.
11. Accessories:

    a. Valves NPS 2 (DN 50) and Smaller: Ball type with threaded ends on inlet and outlet.
    b. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

12. Basis of Design: Watts Series 009

2.5 BALANCING VALVES

A. Memory-Stop Balancing Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Conbraco Industries, Inc.
    b. NIBCO INC.

2. Standard: MSS SP-110 for two-piece, copper-alloy ball valves.
3. Pressure Rating: 400-psig (2760-kPa) minimum CWP.
4. Size: NPS 2 (DN 50) or smaller.
5. Body: Copper alloy.
6. Port: Standard or full port.
7. Ball: Chrome-plated brass.
8. Seats and Seals: Replaceable.
9. End Connections: Solder joint or threaded.
10. Handle: Vinyl-covered steel with memory-setting device.

2.6 STRAINERS FOR DOMESTIC WATER PIPING

A. Y-Pattern Strainers:

1. Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated.
2. Body: Bronze for NPS 2 (DN 50) and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved.
3. End Connections: Threaded for NPS 2 (DN 50) and smaller.
4. Screen: Stainless steel with round perforations unless otherwise indicated.
5. Perforation Size:

    a. Strainers NPS 2 (DN 50) and Smaller: 0.020-inch (0.51-mm).

6. Drain: Pipe plug.

2.7 HOSE BIBBS

A. Hose Bibbs:

1. Standard: ASME A112.18.1 for sediment faucets.
2. Body Material: Bronze.
3. Seat: Bronze, replaceable.
4. Supply Connections: NPS 1/2 or NPS 3/4 (DN 15 or DN 20) threaded or solder-joint inlet.
5. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
6. Pressure Rating: 125 psig (860 kPa).
7. Vacuum Breaker: Integral nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
8. Finish: Rough bronze, or chrome or nickel plated.
9. Operation: Wheel handle.
10. Include wall flange with each hose bibb.

2.8 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves:

1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
2. Pressure Rating: 400-psig (2760-kPa) minimum CWP.
3. Size: NPS 3/4 (DN 20).
4. Body: Copper alloy.
5. Ball: Chrome-plated brass.
6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

2.9 WATER-HAMMER ARRESTERS

A. Water-Hammer Arresters:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Josam Company.
b. Precision Plumbing Products.
c. Watts; a Watts Water Technologies company.
d. Zurn Industries, LLC.

2. Standard: ASSE 1010 or PDI-WH 201.
3. Type: Metal bellows or copper tube with piston.
4. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.

1. Locate backflow preventers in same room as connected equipment or system.
2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe-to-floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are unacceptable for this application.
3. Do not install bypass piping around backflow preventers.

B. Install balancing valves in locations where they can easily be adjusted.

C. Install Y-pattern strainers for water on supply side of each pump.

D. Install water-hammer arresters in water piping according to PDI-WH 201.

3.2 CONNECTIONS

A. Comply with requirements for ground equipment in Section 260526 "Grounding and Bonding for Electrical Systems."

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Test each reduced-pressure-principle backflow preventer according to authorities having jurisdiction and the device's reference standard.

B. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.4 ADJUSTING

A. Set field-adjustable flow set points of balancing valves.

END OF SECTION 221119

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SECTION 221123 - DOMESTIC WATER PUMPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. In-line, sealless centrifugal pumps.
2. Horizontally mounted, in-line, close-coupled centrifugal pumps.

1.2 ACTION SUBMITTALS

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

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. UL Compliance: Comply with UL 778 for motor-operated water pumps.

PART 2 - PRODUCTS

2.1 IN-LINE, SEALLESS CENTRIFUGAL PUMPS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Bell & Gossett; a Xylem brand.
2. Grundfos Pumps Corp.
3. TACO Incorporated.

B. Description: Factory-assembled and -tested, in-line, close-coupled, canned-motor, sealless, overhung-impeller centrifugal pumps.

C. Pump Construction:

1. Pump and Motor Assembly: Hermetically sealed, replaceable-cartridge type with motor and impeller on common shaft and designed for installation with pump and motor shaft horizontal.
2. Casing: Bronze, with threaded or companion-flange connections.
3. Impeller: Plastic.

4. Motor: Single speed, unless otherwise indicated.

D. Capacities and Characteristics:

1. Maximum Continuous Operating Temperature: 220 deg F (104 deg C).
2. Minimum Working Pressure: 175 psig (1200 kPa).
3. Electrical Characteristics:

a. Volts: 120.
b. Phases: Single.
c. Hertz: 60.

2.2 HORIZONTALLY MOUNTED, IN-LINE, CLOSE-COUPLED CENTRIFUGAL PUMPS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Bell & Gossett; a Xylem brand.
2. Goulds.
3. PACO Pumps; Grundfos Pumps Corporation, USA.

B. Description: Factory-assembled and -tested, in-line, single-stage, close-coupled, overhung-impeller centrifugal pumps designed for installation with pump and motor shaft mounted horizontal.

C. Pump Construction:

1. Casing: Radially split with threaded companion-flange connections for pumps with NPS 2 (DN 50) pipe connections and flanged connections for pumps with NPS 2-1/2 (DN 65) pipe connections.
2. Impeller: Statically and dynamically balanced, closed, and keyed to shaft.
3. Shaft and Shaft Sleeve: Steel shaft with deflector, with copper-alloy shaft sleeve. Include water slinger on shaft between motor and seal.
4. Seal: Mechanical, with carbon-steel rotating ring, stainless-steel spring, ceramic seat, and rubber bellows and gasket.
5. Bearings: Oil-lubricated; bronze-journal or ball type.
6. Shaft Coupling: Flexible, capable of absorbing torsional vibration and shaft misalignment.

D. Motor: Single speed, with grease-lubricated ball bearings; and resiliently or rigidly mounted to pump casing.

E. Capacities and Characteristics:

1. Casing Material: Cast iron.
2. Impeller Material: ASTM B 584, cast bronze or stainless steel.
3. Maximum Continuous Operating Temperature: 140 deg F.

4. Electrical Characteristics:

    a. Volts: 240.
    b. Phases: Single.
    c. Hertz: 60.

2.3 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 220513 "Common Motor Requirements for Plumbing Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

2.4 CONTROLS

A. Controls:

1. Enclosure: NEMA 250, Type 4; wall-mounted.
2. Switch Type: Mechanical-float type, in NEMA 250, Type 4 enclosures with mounting rod and electric cables.
3. High-Water Alarm: Rod-mounted, NEMA 250, Type 4 enclosure with mechanical-float switch matching control and electric bell and beacon; Test/silence switch; 120-V ac, with transformer and contacts for remote alarm bell.
4. Remote High-Water Alarm: NEMA 250, Type 4 enclosure with electrical bell and beacon.

B. Control-Interface Features:

1. Remote Alarm Contacts: For remote alarm interface.
2. Indicator Lights providing the following:

    a. On-off status of pump.

PART 3 - EXECUTION

3.1 PUMP INSTALLATION

A. Comply with HI 1.4.

B. Install in-line, sealless centrifugal pumps with shaft horizontal unless otherwise indicated.

C. Install horizontally mounted, in-line, close-coupled centrifugal pumps with shaft horizontal.

D. Install continuous-thread hanger rods and spring hangers of size required to support pump weight.

1. Comply with requirements for vibration isolation devices specified in Section 220529 "Hangars and Supports for Plumbing Piping and Equipment." Fabricate brackets or supports as required.
2. Comply with requirements for hangers and supports specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

3.2 CONNECTIONS

A. Comply with requirements for piping specified in Section 221116 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to pumps to allow service and maintenance.

C. Connect domestic water piping to pumps. Install suction and discharge piping equal to or greater than size of pump nozzles.

1. Install flexible connectors adjacent to pumps in suction and discharge piping of the following pumps:

a. Horizontally mounted, in-line, close-coupled centrifugal pumps.
b. Comply with requirements for flexible connectors specified in Section 221116 "Domestic Water Piping."

2. Install shutoff valve and strainer on suction side of each pump, and check, shutoff, and throttling valves on discharge side of each pump. Install valves same size as connected piping. Comply with requirements for valves specified in Section 220523 "General Valves for Plumbing Piping," and comply with requirements for strainers specified in Section 221119 "Domestic Water Piping Specialties."
3. Install pressure gage and snubber at suction of each pump and pressure gage and snubber at discharge of each pump. Install at integral pressure-gage tappings where provided or install pressure-gage connectors in suction and discharge piping around pumps. Comply with requirements for pressure gages and snubbers specified in Section 220519 "Meters and Gages for Plumbing Piping."

D. Connect floats and pressure switches to pumps that they control.

E. Install and connect control panel and remote alarm. Mount remote alarm on building exterior. Comply with requirements specified in Section 260519 “Low-Voltage Electrical Power Conductors and Cables”.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections:

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:

1. Perform each visual and mechanical inspection.
2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Pumps and controls will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.4 ADJUSTING

A. Adjust domestic water pumps to function smoothly, and lubricate as recommended by manufacturer.

B. Adjust initial float and pressure switch set points.

C. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

END OF SECTION 221123

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SECTION 221223 - FACILITY INDOOR POTABLE-WATER STORAGE TANKS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plastic, nonpressure, potable-water storage tanks.
2. Steel, precharged, potable-water storage tanks.

1.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Steel water tanks shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For water storage tanks, accessories, and components, from manufacturer.

B. Product certificates.

C. Source quality-control reports.

D. Purging and disinfecting reports.

1.5 QUALITY ASSURANCE

A. ASME Compliance for Steel Tanks: Fabricate and label steel, ASME-code, potable-water storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," Division 1.

B. Comply with NSF 61 Annex G, "Drinking Water System Components - Health Effects," for potable-water storage tanks. Include appropriate NSF marking.

PART 2 - PRODUCTS

2.1 PLASTIC, NONPRESSURE, POTABLE-WATER STORAGE TANKS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Snyder Industries, Inc.

B. Description: Plastic, vertical, nonpressure-rated tank with cylindrical sidewalls.

C. Fabricate attachments to tank with reinforcement strong enough to resist tank movement during seismic event when tank supports are anchored to building structure.

D. Construction: High density linear polyethylene (HDLPE).

E. Manhole: Watertight, for tank more than 36 inches (915 mm) in diameter.

F. Cover for Open Tank: Plastic with shape that encloses top of tank.

G. Specialties and Accessories: Include tappings in the tank and the following:

1. Free air vent with insect screen.

H. Tank Interior Finish: Materials and thicknesses complying with NSF 61 Annex G barrier materials for potable-water tank linings. Extend finish into and through tank fittings and outlets.

2.2 STEEL, PRECHARGED, POTABLE-WATER STORAGE TANKS

A. Steel, Precharged, Diaphragm, Water Storage Tanks:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. AMTROL, Inc.
b. Armstrong Pumps, Inc.
c. Wessels Company.

2. Description: Steel, vertical, pressured-rated tank with cylindrical sidewalls and with air-charging valve and air precharge.
3. Fabricate supports and attachments to tank with reinforcement strong enough to resist tank movement during seismic event when tank supports are anchored to building structure.
4. Operation: Factory-installed, butyl-rubber diaphragm.

B. Construction: Steel, constructed with nontoxic welded joints, for 125-psig (860-kPa) working pressure.

C. Tappings: Factory-fabricated steel, welded to tank before testing and labeling.

1. NPS 2 (DN 50) and Smaller: ASME B1.20.1, with female thread.

D. Specialties and Accessories: Include tappings in tank and the following:

1. Pressure gage.

E. Vertical Tank Supports: Factory-fabricated steel legs or steel skirt, welded to tank.

F. Tank Interior Finish: Materials and thicknesses complying with NSF 61 Annex G barrier materials for potable-water tank linings. Extend finish into and through tank fittings and outlets.

G. Exterior Coating: Manufacturer's standard enamel paint.

2.3 SOURCE QUALITY CONTROL

A. Test and inspect potable-water storage tanks according to the following tests and inspections and prepare test reports:

1. Pressure Testing for Non-ASME-Code, Pressure, Potable-Water Storage Tanks: Hydrostatically test to ensure structural integrity and freedom from leaks at pressure of 50 psig (345 kPa) above system operating pressure, but not less than 150 psig (1035 kPa). Fill tanks with water, vent air, pressurize tanks, disconnect test equipment, hold pressure for two hours with no drop in pressure, and check for leaks.
2. Testing for Nonpressure, Potable-Water Storage Tanks: Fill tanks to water operating level to ensure structural integrity and freedom from leaks. Hold water level for two hours with no drop in water level.

B. Repair or replace tanks that fail test with new tanks, and repeat until test is satisfactory.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install water storage tanks on concrete bases, level and plumb, firmly anchored. Arrange so devices needing servicing are accessible.

B. Anchor tank supports and tanks to substrate.

C. Install tank seismic restraints.

D. Install thermometers and pressure gages on water storage tanks and piping if indicated. Thermometers and pressure gages are specified in Section 220519 "Meters and Gages for Plumbing Piping."

E. Install the following devices on tanks where indicated:

1. Vacuum relief valves.
2. Tank vents on nonpressure tanks.
3. Connections to accessories.

F. After installing tanks with factory finish, inspect finishes and repair damages to finishes.

3.2 CONNECTIONS

A. Piping installation requirements are specified in Section 221116 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to potable-water storage tanks to allow service and maintenance.

C. Connect water piping to water storage tanks with unions or flanges and with shutoff valves. Connect tank drains with shutoff valves and discharge over closest floor drains.

1. General-duty valves are specified in Section 220523 "General Valves for Plumbing Piping."

a. Valves NPS 2 (DN 50) and Smaller: ball.
b. Drain Valves: NPS 3/4 (DN 20) gate or ball valve. Include outlet with, or nipple in outlet with, ASME B1.20.7, 3/4-11.5NH thread for garden-hose service, threaded cap, and chain.

2. Water Piping Connections: Make connections to dissimilar metals with dielectric fittings. Dielectric fittings are specified in Section 221116 "Domestic Water Piping."

3.3 IDENTIFICATION

A. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

A. Perform the following final checks before filling:

1. Verify that air precharge in precharged tanks is correct.
2. Test operation of tank accessories and devices.
3. Verify that pressure relief valves have correct setting.

a. Manually operate pressure relief valves.
b. Adjust pressure settings.

B. Filling Procedures: Follow manufacturer's written procedures. Fill tanks with water to operating level.

3.5 CLEANING

A. Clean and disinfect potable-water storage tanks.

B. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed, use procedure described in AWWA C652 or as described below:

1. Purge water storage tanks with potable water.
2. Disinfect tanks by one of the following methods:

a. Fill tanks with water-chlorine solution containing at least 50 ppm (50 mg/L) of chlorine. Isolate tanks and allow to stand for 24 hours.
b. Fill tanks with water-chlorine solution containing at least 200 ppm (200 mg/L) of chlorine. Isolate tanks and allow to stand for three hours.

3. Flush tanks, after required standing time, with clean, potable water until chlorine is not present in water coming from tank.
4. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination made by authorities having jurisdiction shows evidence of contamination.

C. Prepare written reports for purging and disinfecting activities.

END OF SECTION 221223

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SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Thermal-hanger shield inserts.
4. Fastener systems.
5. Equipment supports.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
2. Design seismic-restraint hangers and supports for piping and equipment.

1.3 ACTION SUBMITTALS

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

B. Shop Drawings: Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Equipment supports.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.5 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

2.2 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.3 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.4 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches (100 mm) thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool

manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.

2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

C. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

D. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

E. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

F. Install lateral bracing with pipe hangers and supports to prevent swaying.

G. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 (DN 65) and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

H. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

I. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches (40 mm).

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils (0.05 mm).

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports and attachments for general service applications.

F. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.

G. Use padded hangers for piping that is subject to scratching.

H. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
2. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
3. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).

I. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24 (DN 24 to DN 600).

J. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.

K. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.

L. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

M. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 230529

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SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Pipe labels.
3. Valve tags.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Plastic Labels for Equipment:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. Brimar Industries, Inc.
   b. Craftmark Pipe Markers.
   c. Seton Identification Products.

2. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16-inch (1.6-mm) thick, and having predrilled holes for attachment hardware.
3. Letter Color: White.
4. Background Color: Black.
5. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).
6. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2-by-3/4-inch (64-by-19-mm).

7. Minimum Letter Size: 1/4-inch (6.4-mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2-inch (13-mm) for viewing distances up to inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
8. Fasteners: Stainless-steel rivets or self-tapping screws.
9. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number.

C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by 11-inch (A4) bond paper. Tabulate equipment identification number, and identify Drawing numbers where equipment is indicated (plans, details, and schedules). Equipment schedule shall be included in operation and maintenance data.

2.2 PIPE LABELS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brimar Industries, Inc.
2. Craftmark Pipe Markers.
3. Seton Identification Products.

B. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction according to ASME A13.1.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include pipe size and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1/2-inch (13-mm) for viewing distances up to 72 inches (1830 mm) and proportionately larger lettering for greater viewing distances.

2.3 VALVE TAGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brimar Industries, Inc.
2. Craftmark Pipe Markers.
3. Seton Identification Products.

B. Description: Stamped or engraved with 1/4-inch (6.4-mm) letters for piping system abbreviation and 1/2-inch (13-mm) numbers.

1. Tag Material: Brass, 0.032-inch (0.8-mm) or stainless steel, 0.025-inch (0.64-mm) minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass wire-link chain or beaded chain.

C. Valve Schedules: For each piping system, on 8-1/2-by-11-inch (A4) bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.3 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.4 PIPE LABEL INSTALLATION

A. Pipe Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations and on both sides of through walls, floors, ceilings, and inaccessible enclosures.

4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 25 feet (7.6 m) along each run. Reduce intervals to 10 feet (3.1 m) in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

B. Directional Flow Arrows: Arrows shall be used to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.

C. Pipe Label Color Schedule:

1. Fuel Oil Piping: Black letters on safety-yellow background.

3.5 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, shutoff valves, faucets, convenience and lawn-watering hose connections, and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:

a. Fuel Oil Piping: 2 inches (50 mm), round.

2. Valve-Tag Colors:

a. Cold Water: Natural.

3. Letter Colors:

a. Cold Water: White or Natural.

END OF SECTION 230553

SECTION 231113 - FACILITY FUEL-OIL PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fuel-oil pipes, tubes, and fittings.
2. Piping specialties.
3. Manual fuel-oil shutoff valves.
4. Specialty valves.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Pipe Welding Qualifications: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Comply with ASME B31.9, "Building Services Piping," for fuel-oil piping materials, installation, testing, and inspecting.

B. Fuel-Oil Valves: Comply with UL 842 and have service mark initials "WOG" permanently marked on valve body.

C. Comply with requirements of the EPA and of state and local authorities having jurisdiction. Include recording of fuel-oil piping.

2.2 PERFORMANCE REQUIREMENTS

A. Maximum Operating-Pressure Ratings: 3-psig (21-kPa) fuel-oil supply pressure at oil-fired appliances.

2.3 PIPES, TUBES, AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M, for butt and socket welding.
3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
4. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:

a. Material Group: 1.1.
b. End Connections: Threaded or butt welding to match pipe.
c. Lapped Face: Not permitted underground.
d. Gasket Materials: Asbestos free, ASME B16.20 metallic, or ASME B16.21 nonmetallic, gaskets compatible with fuel oil.
e. Bolts and Nuts: ASME B18.2.1, cadmium-plated steel.

B. Copper Pipe:

1. Soft Copper Tube: ASTM B 88, Type K (ASTM B 88M, Type A) water tube, annealed temper.
2. Cast-Copper, Flare-Joint Fittings: ASME B16.18, pressure fittings.
3. Wrought-Copper, Flare-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

2.4 PIPING SPECIALTIES

A. Nonmetallic Flexible Connectors:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. American Flexible Hose Co., Inc.
b. Flexicraft Industries.
c. Tru-Flex Metal Hose Corp.

2. PFTE bellows with woven, flexible, bronze or stainless-steel, wire-reinforcing protective jacket.
3. Minimum Operating Pressure: 150 psig (1035 kPa).
4. End Connections: Socket, flanged, or threaded end to match connected piping.
5. Maximum Length: 30 inches (762 mm.)

B. Y-Pattern Strainers:

1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.

2. End Connections: Threaded ends for NPS 2 (DN 50) and smaller; flanged ends for NPS 2-1/2 (DN 65) and larger.
3. Strainer Screen: 60-mesh startup strainer and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig (860 kPa).

C. Oil Safety Valves: Comply with UL 842.

1. Listed and labeled for fuel-oil service by an NRTL acceptable to authorities having jurisdiction.
2. Body: Brass, bronze, or cast steel.
3. Springs: Stainless steel.
4. Seat and Diaphragm: Nitrile rubber.
5. Orifice: Stainless steel, interchangeable.
6. Factory-Applied Finish: Baked enamel.
7. Manual override port.
8. Maximum Inlet Pressure: 60 psig.

D. Emergency Shutoff (Fusible) Valves: Comply with UL 842

1. Listed and labeled for fuel-oil service by an NRTL acceptable to authorities having jurisdiction.
2. Double poppet valve.
3. Body: ASTM A 126, cast iron.
4. Disk: FPM.
5. Poppet Spring: Stainless steel.
6. Stem: Plated brass.
7. O-Ring: FPM.
8. Packing Nut: PTFE-coated brass.
9. Fusible link to close valve at 165 deg F (74 deg C).
10. Thermal relief to vent line pressure buildup due to fire.
11. Air test port.
12. Maximum Operating Pressure: 0.5 psig (3.45 kPa).

E. Filters and Filter Housing:

1. General Fuel Oil Products, Model 2A-700B, Maximum flow: 25 gpm, 10 micron.

2.5 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Nipples:

1. Standard: IAPMO PS 66.
2. Electroplated steel nipple complying with ASTM F 1545.
3. Pressure Rating and Temperature: 300 psig (2070 kPa) at 225 deg F (107 deg C).

4. End Connections: Male threaded.
5. Lining: Inert and noncorrosive, propylene.

2.6 JOINING MATERIALS

A. Joint Compound and Tape for Threaded Joints: Suitable for fuel oil.

B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Comply with requirements in Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

3.2 PREPARATION

A. Close equipment shutoff valves before turning off fuel oil to premises or piping section.

B. Comply with NFPA 30 and NFPA 31 requirements for prevention of accidental ignition.

3.3 OUTDOOR PIPING INSTALLATION

A. Steel Piping with Protective Coating:

1. Apply joint cover kits to pipe after joining, to cover, seal, and protect joints.
2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer. Review protective coating damage with Architect prior to repair.
3. Replace pipe having damaged PE coating with new pipe.

B. Install vent pipe at a minimum slope of 2 percent downward toward fuel-oil storage tank sump.

C. Assemble and install entry boots for pipe penetrations through sump sidewalls for liquid-tight joints.

D. Install metal pipes, fittings, valves, and flexible connectors at piping connections to AST and UST.

E. Install fittings for changes in direction in rigid pipe.

F. Install system components with pressure rating equal to or greater than system operating pressure.

3.4 INDOOR PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction to allow for mechanical installations.

C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings at a height that allows sufficient space for ceiling panel removal.

F. Install piping free of sags and bends.

G. Install fittings for changes in direction and branch connections.

H. Comply with requirements for equipment specifications for roughing-in requirements.

I. Conceal pipe installations in walls, pipe spaces, or utility spaces; above ceilings; below grade or floors; and in floor channels unless indicated to be exposed to view.

J. Prohibited Locations:

1. Do not install fuel-oil piping in or through HVAC ducts and plenums, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
2. Do not install fuel-oil piping in solid walls or partitions.

K. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

L. Connect branch piping from top or side of horizontal piping.

M. Install unions in pipes NPS 2 (DN 50) and smaller at final connection to each piece of equipment and elsewhere as indicated. Unions are not required on flanged devices.

N. Do not use fuel-oil piping as grounding electrode.

3.5 VALVE INSTALLATION

A. Install manual fuel-oil shutoff valves on branch connections to fuel-oil appliance.

B. Install valves in accessible locations.

C. Install oil safety valves at inlet of each oil-fired appliance.

D. Install two-piece, bronze ball valve with hose end connection at low points in fuel-oil piping. Comply with requirements in Section 220523 "General Valves for Plumbing Piping."

E. Install manual air vents at high points in fuel-oil piping.

3.6 PIPING JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Flare Joints: Fabricate flare joints according to SAE J533 Standard.

3.7 HANGER AND SUPPORT INSTALLATION

A. Pipe hanger and support and equipment support materials and installation requirements are specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:

1. NPS 1-1/4 (DN 32) and Smaller: Maximum span, 84 inches (2130 mm); minimum rod size, 3/8-inch (10-mm).

C. Support vertical steel pipe at each floor and at spacing not greater than 15 feet (4.5 m).

D. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 (DN 20) and Smaller: 60 inches (1500 mm) with 3/8-inch (10-mm) rod.

E. Install supports for vertical copper tubing every 10 feet (3 m).

3.8 CONNECTIONS

A. Where installing piping adjacent to equipment, allow space for service and maintenance.

B. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment having threaded pipe connection.

C. Connect piping to equipment with shutoff valve and union. Install union between valve and equipment.

D. Install flexible piping connectors at final connection to burners or oil-fired appliances.

3.9 LABELING AND IDENTIFYING

A. Nameplates, pipe identification, valve tags, and signs are specified in Section 230553 "Identification for HVAC Piping and Equipment."

3.10 FIELD QUALITY CONTROL

A. Pressure Test Piping: Minimum hydrostatic or pneumatic test-pressures measured at highest point in system:

1. Fuel-Oil Distribution Piping: Minimum 5 psig (34.5 kPa) for minimum 30 minutes.
2. Isolate storage tanks if test pressure in piping will cause pressure in storage tanks to exceed 10 psig (69 kPa).

B. Inspect and test fuel-oil piping according to NFPA 31, "Tests of Piping" Paragraph; and according to requirements of authorities having jurisdiction.

C. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Bleed air from fuel-oil piping using manual air vents.

E. Fuel-oil piping and equipment will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

3.11 OUTDOOR PIPING SCHEDULE

A. Aboveground Fuel-Oil Piping: Steel pipe, steel or malleable-iron threaded fittings, and threaded joints.

B. Aboveground Fuel-Oil Piping: Copper pipe, copper or malleable-bronze flare fittings, and flare joints

3.12 INDOOR PIPING SCHEDULE

A. Aboveground Fuel-Oil Piping: Steel pipe, steel or malleable-iron threaded fittings, and threaded joints

B. Aboveground Fuel-Oil Piping: Copper pipe, copper or malleable-bronze flare fittings, and flare joints

3.13 SHUTOFF VALVE SCHEDULE

A. Valves for Aboveground Distribution Piping:

1. Two-piece, full-port, bronze ball valves with bronze trim.

B. Valves in Branch Piping:

1. Two-piece, full-port, bronze ball valves with bronze trim.

END OF SECTION 231113

SECTION 231323 - FACILITY ABOVEGROUND FUEL-OIL STORAGE TANKS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Horizontal, steel, fuel-oil ASTs.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include plans, elevations, sections, and ballast pads and anchors, and lifting or supporting points.
2. Indicate dimensions, components, and location and size of each field connection.

1.3 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For ASTs, accessories, and components, from manufacturer.

B. Field quality-control reports.

C. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of fuel-oil storage tanks that fail in materials or workmanship within specified warranty period.

1. Storage Tanks:

a. Failures include, but are not limited to, the following when used for storage of fuel oil at temperatures not exceeding 150 deg F (66 deg C):

1) Structural failures including cracking, breakup, and collapse.

2) Corrosion failure including external and internal corrosion of steel tanks.

b. Warranty Period: 1 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Division 01 to design restraint and anchors for fuel-oil ASTs, and equipment, including comprehensive engineering analysis, using performance requirements and design criteria indicated.

B. Seismic Performance: Factory-installed support attachments for AST shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts when subjected to the seismic forces specified."

2.2 HORIZONTAL, STEEL, FUEL-OIL AST

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Ace Tank & Fueling Equipment, LLC.
2. Anchorage Tank.
3. Greer Tank.

B. Description: UL 142, single-wall, horizontal, steel tank.

C. Construction: Fabricated with welded, carbon steel; suitable for operation at atmospheric pressure and for storing fuel oil with specific gravity up to 1.1 and with maintained temperature up to 150 deg F (66 deg C).

D. Supports: Manufacturer's standard structural steel welded to tank.

E. Supports: Manufacturer's standard type and number, steel or cast-iron cradles, for field installation.

2.3 SHOP PAINTING OF AST

A. Prepare exterior steel surface of AST and tank supports.

B. After cleaning, remove dust or residue from cleaned surfaces.

C. If surface develops rust before prime coat is applied, repeat surface preparation.

D. Apply manufacturer's standard prime coat to shop-cleaned, dry surface same day as surface preparation.

E. Apply manufacturer's standard two-component, epoxy finish coats.

2.4 FUEL-OIL AST ACCESSORIES

A. Threaded pipe connection fittings on top or sides of tank as indicated, for fill, supply, return, vent, sounding, and gaging. Include cast-iron plugs for shipping.

B. Striker Plates: Inside tank, on bottom below fill, vent, sounding, gage, and other tube openings.

C. Lifting Lugs: For handling and installation.

D. Ladders: Carbon-steel ladder inside tank, anchored to top and bottom, and located as indicated. Include reinforcement of tank at bottom of ladder.

E. Supply Tube: Extension of supply piping fitting into tank, terminating above tank bottom and cut at a 45-degree angle (1:1 slope).

F. Sounding and Gage Tubes: Extension of fitting into tank, above tank bottom and cut at a 45-degree angle (1:1 slope).

2.5 LIQUID-LEVEL GAGE SYSTEM

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Krueger Sentry Gauge.
2. Morrison Brothers.

B. Mechanical Gauge: direct read, float style, vapor tight fog free design, with acrylic gauge face cover.

2.6 SOURCE QUALITY CONTROL

A. Pressure test and inspect fuel-oil storage tanks, after fabrication and before shipment, according to ASME and the following:

1. Horizontal, Single-Wall Steel ASTs: UL 142.

B. Affix standards organization's code stamp.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Comply with requirements in Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

B. Allow for cast-in-place, concrete base.

3.2 FUEL-OIL AST INSTALLATION

A. Install tank bases and supports.

B. Concrete Bases: Anchor AST to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit.
2. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
3. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts to elevations required for proper attachment to supported equipment.
5. Use 3000-psig (20.7-MPa), 28-day, compressive-strength concrete and reinforcement.

C. Connect piping and vent fittings.

D. Install ground connections.

E. Install steel ASTs according to STI R912.

3.3 LIQUID-LEVEL GAGE SYSTEM INSTALLATION

A. Install liquid-level gage system.

3.4 LABELING AND IDENTIFYING

A. Nameplates, pipe identification, and signs are specified in Section 230553 "Identification for HVAC Piping and Equipment."

3.5 FIELD PAINTING OF AST

A. Prepare and touch up damaged exterior surface of AST and supports as specified in "Shop Painting of AST" Article.

3.6 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Tanks: Minimum hydrostatic or compressed-air test pressures for fuel-oil storage tanks that have not been factory tested and do not bear the ASME code stamp or a listing mark acceptable to authorities having jurisdiction:

a. Single-Wall Tanks: Minimum 3 psig (20.7 kPa) and maximum 5 psig (34.5 kPa).
b. Maintain the test pressure for one hour.

B. ASTs will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 231323

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SECTION 235533.13 - OIL-FIRED UNIT HEATERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes oil-fired unit heaters.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of oil-fired unit heater.

1. Include rated capacities, operating characteristics, and accessories.

B. Shop Drawings: For oil-fired unit heaters. Include plans, elevations, sections, and attachment details.

1. Design Calculations: Calculate requirements for selecting seismic restraints.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace heat exchanger of oil-fired unit heater that fails in materials or workmanship within specified warranty period.

1. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Toyotomi U.S.A., Inc.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Oil-fired unit heaters shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. Seismic Fabrication Requirements: Fabricate and reinforce suspension attachments of oil-fired unit heaters, accessories mountings, and components with reinforcement strong enough to withstand seismic forces defined in Section 220529 "Hangars and Supports for Plumbing Piping and Equipment" when oil-fired unit heater is anchored to building structure.
2. The term "withstand" means "the unit will remain in place without separation of any parts when subjected to the seismic forces specified."

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Capacities and Characteristics:

1. Annual Fuel Utilization Efficiency: 90 percent.
2. Electrical Characteristics:

a. Volts: 120.
b. Phase: Single.
c. Hertz: 60.

2.3 MANUFACTURED UNITS

A. Description: Factory assembled, piped, and wired, and complying with UL 731.

B. Housing: Steel, with inserts for suspension mounting rods.

1. External Casings and Cabinets: Baked enamel over corrosion-resistant-treated surface.
2. Discharge Louvers: Independently adjustable, horizontal blades.

C. Accessories:

1. Oil safety valve.
2. Outdoor Combustion-Air Adapter: Sealed to housing and fitted with quick access cover or door and fitting for terminating outdoor-air duct.

D. Heat Exchanger: Minimum 0.09-inch (2.2-mm) steel.

E. Propeller Unit Fan:

1. Blades dynamically balanced and resiliently mounted.
2. Steel fan-blade guard.

F. Motors:

1. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 220513 "Common Motor Requirements for Plumbing Equipment."
2. Enclosure Materials: Rolled steel.

G. Controls: Factory piped and prewired to electrical junction box mounted on unit, including the following:

1. Control Transformer: Integrally mounted, 120- to 24-V ac.
2. Cad-cell safety system.
3. Manual reset safety.
4. Automatic Fan Thermal Switch: Fan operates with heat-exchanger temperature more than 135 deg F (58 deg C).
5. Wall-Mounted Thermostat:

a. Single stage.
b. Fan on-off-automatic switch.
c. 24-V ac.
d. 50 to 90 deg F (10 to 32 deg C) operating range.

H. Electrical Connection: Factory wire motors and controls for a single electrical connection.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install and connect oil-fired unit heaters and associated fuel and vent piping according to NFPA 31, applicable local codes and regulations, and manufacturer's written instructions.

3.2 EQUIPMENT MOUNTING

1. Anchor the unit to resist code-required horizontal acceleration.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to oil-fired unit heater, allow space for service and maintenance.

C. Fuel Oil Piping: Comply with Section 231113 "Facility Fuel-Oil Piping." Connect to fuel oil supply and return piping with shutoff valve and union at each connection.

D. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

E. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Perform the following tests and inspections:

1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
2. Verify bearing lubrication.
3. Verify proper motor rotation.
4. Test Reports: Prepare a written report to record the following:

a. Test procedures used.
b. Test results that comply with requirements.
c. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

C. Oil-fired unit heater will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.5 ADJUSTING

A. Adjust initial temperature and humidity set points.

B. Adjust burner and other unit components for optimum heating performance and efficiency.

3.6 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain oil-fired unit heaters.

END OF SECTION 235533.13

SECTION 260500 – GENERAL DESCRIPTION OF ELECTRICAL SCOPE OF WORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Overview of the Electrical Scope of Work for this project.

1.2 GENERAL

A. The omission of express reference to any parts necessary for, or reasonably incidental to a complete electrical installation, shall not be construed from releasing the Contractor from furnishing such parts.

B. Work included consists of the furnishing of all labor, material, equipment, and supervision required to complete the Electrical Work as shown on the Drawings and specified in the Specifications.

C. All work shall be in accordance with the 2011 NEC and each system shall be complete, fully functioning, and installed with good workmanship in accordance with the NECA-NEIS standard.

1.3 SCOPE OF WORK

A. This includes, but not limited to:

1. Disconnection the electrical service to the existing well house.
2. Locate and mark underground feeder from the existing well house back to place of origin, Main Office Building. This feeder is not to be damaged by the installation of the new water line. Keep it protected.
3. Remove existing electrical systems, conduit, conductors, and devices in the existing well house.
4. Before extending the existing feeder to the new well house, megger test the feeder to ensure that the insulation has not been damaged.
5. Intercept the existing feeder to well house by installing a new handhole and extend feeder to new service entrance equipment. Do not place handhole in traffic area.
6. Install new electrical equipment, fixtures, devices, heat trace, and controls in new well house.

1.4 QUALITY ASSURANCE

A. The electrical installation shall comply with rules and regulations of the latest edition of the Occupational Safety and Health Act, National Electrical Code, the National Electrical Safety Code, the Electrical Utility furnishing electrical energy to this project and any other board having jurisdiction over the electrical installation.

1.5 EXISTING EQUIPMENT

A. The Electrical Contractor shall be responsible for disconnecting, removal, storage, reinstallation and reconnection of existing equipment that is to remain but has been disconnected because of removal of other equipment and/or building structure.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 260500

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Belden Inc.
2. Encore Wire Corporation.
3. General Cable Technologies Corporation.
4. Southwire Incorporated.
5. The Okonite Company.

B. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.

C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type XHHW-2.

D. Multiconductor Cable: Comply with NEMA WC 70/ICEA S-95-658 for armored cable, Type AC and Type USE with ground wire.

2.2 CONNECTORS AND SPLICES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Hubbell Power Systems, Inc.
2. Ideal Industries, Inc.
3. O-Z/Gedney; a brand of the EGS Electrical Group.
4. 3M; Electrical Markets Division.
5. Tyco Electronics.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger, except VFC cable, which shall be extra flexible stranded.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Feeders and Branch Circuits: Type XHHW-2, single conductors in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.

3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test conductors feeding panelboards
2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

B. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION 260519

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SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes grounding and bonding systems and equipment.

1.2 ACTION SUBMITTALS

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

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Burndy; Part of Hubbell Electrical Systems.
2. ERICO International Corporation.
3. O-Z/Gedney; A Brand of the EGS Electrical Group.
4. Robbins Lightning, Inc.

2.2 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.3 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.

2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4-inch (6-mm) in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16-inch (1.6-mm) thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16-inch (1.6-mm) thick.

2.4 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

D. Cable-to-Cable Connectors: Compression type, copper or copper alloy.

E. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.5 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 3/4-inch by 10 feet (19-mm by 3 m).

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Heat-Tracing Cables: Install a separate insulated equipment grounding conductor to each electric heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

3.4 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2. For grounding electrode system, install at least one rod. If additional rods need to be installed space them at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

D. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

END OF SECTION 260526

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SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.

B. Related Sections include the following:

1. Section 260548.16 "Seismic Controls for Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

1.2 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. IMC: Intermediate metal conduit.

C. RMC: Rigid metal conduit.

D. GRS: Galvanized rigid steel conduit.

E. RNC: Rigid non-metallic conduit.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Steel slotted support systems.

1.4 QUALITY ASSURANCE

A. Comply with NFPA 70.

1.5 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified together with concrete Specifications.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Allied Tube & Conduit.
b. Cooper B-Line, Inc.; a division of Cooper Industries.
c. ERICO International Corporation.
d. Thomas & Betts Corporation.
e. Unistrut; Tyco International, Ltd.
f. Wesanco, Inc.

2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
3. Channel Dimensions: Selected for applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To Existing Concrete: Expansion anchor fasteners.

3.3 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).

B. Touchup: Comply with requirements in Specifications for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

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SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Boxes, enclosures, and cabinets.
4. Handholes and boxes for exterior underground cabling.

1.2 DEFINITIONS

A. ARC: Aluminum rigid conduit.

B. GRC: Galvanized rigid steel conduit.

C. IMC: Intermediate metal conduit.

1.3 ACTION SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Allied Tube & Conduit.
2. O-Z/Gedney.
3. Republic Conduit.
4. Robroy Industries.
5. Southwire Company.
6. Thomas & Betts Corporation.
7. Western Tube and Conduit Corporation.
8. Wheatland Tube Company.

B. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. GRC: Comply with ANSI C80.1 and UL 6.

D. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

E. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
2. Fittings for EMT:

a. Material: Steel or die cast.
b. Type: Setscrew or compression.

3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040-inch (1-mm), with overlapping sleeves protecting threaded joints.

F. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. AFC Cable Systems, Inc.
2. CANTEX Inc.
3. CertainTeed Corporation.
4. Lamson & Sessions.
5. RACO; Hubbell.
6. Thomas & Betts Corporation.

B. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

D. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

2.3 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Cooper Technologies Company; Cooper Crouse-Hinds.
2. Erickson Electrical Equipment Company.
3. Hoffman.
4. Hubbell Incorporated.
5. O-Z/Gedney.
6. Robroy Industries.
7. Thomas & Betts Corporation.

B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy or aluminum, Type FD, with gasketed cover.

D. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum or galvanized, cast iron with gasketed cover.

E. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.

2.4 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. General Requirements for Handholes and Boxes:

1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Armorcast Products Company.
b. Carson Industries LLC.
c. Oldcastle Precast, Inc.
d. Quazite: Hubbell Power System, Inc.

2. Standard: Comply with SCTE 77.

3. Configuration: Designed for flush burial with open bottom unless otherwise indicated.
4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
6. Cover Legend: Molded lettering, "ELECTRIC.".
7. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
8. Handholes 12 inches Wide by 24 inches Long (300 mm Wide by 600 mm Long) and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

2.5 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.

1. Tests of materials shall be performed by an independent testing agency.
2. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
3. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012 and traceable to NIST standards.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: GRC
2. Vibration Isolation & Frost Heaving: LFMC
3. Underground Horizontal Conduit: RNC, Type EPC-40-PVC,
4. Underground Vertical Riser and sweep elbow: GRC
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Minimum Raceway Size: 3/4-inch (21-mm) trade size.

C. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

D. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

E. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F (49 deg C).

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

E. Arrange stub-ups so curved portions of bends are not visible above finished slab.

F. Install no more than the equivalent of three 90 degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches (300 mm) of changes in direction.

G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

H. Support conduit within 12 inches (300 mm) of enclosures to which attached.

I. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

J. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

K. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch (35-mm) trade size and insulated throat metal bushings on 1-1/2-inch (41-mm) trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

L. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

M. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

N. Cut conduit perpendicular to the length. For conduits 2-inch (53-mm) trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

O. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

P. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

Q. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Where otherwise required by NFPA 70.

R. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

S. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches (1830 mm) of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC in damp or wet locations not subject to severe physical damage.

T. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to top bottom of box unless otherwise indicated.

U. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

V. Locate boxes so that cover or plate will not span different building finishes.

W. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 312000 "Earth Moving" for pipe less than 6 inches (150 mm) in nominal diameter.
2. Install backfill as specified in Section 312000 "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with

expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches (300 mm) of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 312000 "Earth Moving."

4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches (75 mm) of concrete for a minimum of 12 inches (300 mm) on each side of the coupling.

6. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch (12.5-mm) sieve to No. 4 (4.75-mm) sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1-inch (25-mm) above finished grade.

D. Install handholes with bottom below frost line, or a maximum of two stacked boxes.

E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables but short enough to preserve adequate working clearances in enclosure.

F. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

SECTION 260548.16 - SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Restraint channel bracings.
2. Restraint cables.
3. Seismic-restraint accessories.
4. Mechanical anchor bolts.
5. Adhesive anchor bolts.

B. Related Requirements:

1. Section 260529 "Hangers and Supports for Electrical Systems" for commonly used electrical supports and installation requirements.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.

    a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction.
    b. Annotate to indicate application of each product submitted and compliance with requirements.

B. Delegated-Design Submittal: For each seismic-restraint device.

1. Include design calculations and details for selecting seismic restraints complying with performance requirements, design criteria, and analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
2. Design Calculations: Calculate static and dynamic loading caused by equipment weight, operation, and seismic and wind forces required to select seismic and wind restraints and for designing vibration isolation bases.

    a. Coordinate design calculations with wind load calculations required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.

3. Seismic- and Wind-Restraint Details:

    a. Design Analysis: To support selection and arrangement of seismic and wind restraints. Include calculations of combined tensile and shear loads.

b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
c. Coordinate seismic-restraint and vibration isolation details with wind-restraint details required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.
d. Preapproval and Evaluation Documentation: By an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Show coordination of seismic bracing for electrical components with other systems and equipment in the vicinity, including other supports and seismic restraints.

B. Qualification Data: For professional engineer**.**

C. Welding certificates.

D. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory as defined by OSHA in 29 CFR 1910.7 and that is acceptable to authorities having jurisdiction.

B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Seismic-restraint devices shall have horizontal and vertical load testing and analysis. They shall bear anchorage preapproval from OSHPD in addition to preapproval, showing maximum seismic-restraint ratings, by ICC-ES or another agency acceptable to authorities having jurisdiction. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) that support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

E. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Wind-Restraint Loading:

1. Basic Wind Speed: 100 MPH.
2. Building Classification Category: II.
3. Minimum 10 lb/sq. ft. multiplied by maximum area of HVAC component projected on vertical plane normal to wind direction and 45 degrees either side of normal.

B. Seismic-Restraint Loading: Information below is for Copper Center, Alaska.

1. Site Class as Defined in the IBC: D.
2. Assigned Seismic Use Group or Building Category as Defined in the IBC: II.

a. Component Importance Factor: as required by ASCE7 for component.
b. Component Response Modification Factor: as required by ASCE7 for component.
c. Component Amplification Factor: as required by ASCE7 for component.

3. Design Spectral Response Acceleration at Short Periods (0.2 Second): 0.75g.
4. Design Spectral Response Acceleration at 1.0-Second Period: 0.39g.

2.2 RESTRAINT CHANNEL BRACINGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Cooper B-Line, Inc.; a Division of Cooper Industries.
2. Hilti, Inc.
3. Mason Industries, Inc.
4. Unistrut; Atkore International.

B. Description: MFMA-4, shop- or field-fabricated bracing assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end, with other matching components, and with corrosion-resistant coating; rated in tension, compression, and torsion forces.

2.3 RESTRAINT CABLES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Kinetics Noise Control, Inc.
2. Loos & Co., Inc.
3. Vibration Mountings & Controls, Inc.

B. Restraint Cables: ASTM A 603 galvanized-steel cables. End connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; with a minimum of two clamping bolts for cable engagement.

2.4 SEISMIC-RESTRAINT ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Cooper B-Line, Inc.; a Division of Cooper Industries.
2. Kinetics Noise Control, Inc.
3. Mason Industries, Inc.
4. TOLCO; a brand of NIBCO INC.

B. Hanger-Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod.

C. Hinged and Swivel Brace Attachments: Multifunctional steel connectors for attaching hangers to rigid channel bracings.

D. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings and matched to type and size of anchor bolts and studs.

E. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings and matched to type and size of attachment devices used.

F. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

2.5 MECHANICAL ANCHOR BOLTS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Cooper B-Line, Inc.; a Division of Cooper Industries.
2. Hilti, Inc.
3. Kinetics Noise Control, Inc.
4. Mason Industries, Inc.

B. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

2.6 ADHESIVE ANCHOR BOLTS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Hilti, Inc.
2. Kinetics Noise Control, Inc.
3. Mason Industries, Inc.

B. Adhesive Anchor Bolts: Drilled-in and capsule anchor system containing PVC or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and equipment to receive vibration isolation and seismic-control devices for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for reinforcement and cast-in-place anchors to verify actual locations before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

A. Multiple Raceways or Cables: Secure raceways and cables to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.

B. Hanger-Rod Stiffeners: Install hanger-rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods caused by seismic forces.

C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.3 SEISMIC-RESTRAINT DEVICE INSTALLATION

A. Equipment and Hanger Restraints:

1. Install resilient, bolt-isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125-inch (3.2-mm).

2. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.

B. Install cables so they do not bend across edges of adjacent equipment or building structure.

C. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.

D. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

E. Drilled-in Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the professional engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
5. Set anchors to manufacturer's recommended torque using a torque wrench.
6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Install flexible connections in runs of raceways, cables, wireways, cable trays, and busways where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where connection is terminated to equipment that is anchored to a different structural element from the one supporting them as they approach equipment.

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.

2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.
3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
5. Test to 90 percent of rated proof load of device.

B. Seismic controls will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.6 ADJUSTING

A. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION 260548.16

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SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Warning labels and signs.
6. Instruction signs.
7. Equipment identification labels.
8. Miscellaneous identification products.

1.2 ACTION SUBMITTALS

A. Product Data: For each electrical identification product indicated.

1.3 QUALITY ASSURANCE

A. Comply with ANSI A13.1.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.4 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.

B. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

C. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

D. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

2.2 UNDERGROUND-LINE WARNING TAPE

A. Tape:

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical feeder lines.
2. Printing on tape shall be permanent and shall not be damaged by burial operations.
3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing:

1. Comply with ANSI Z535.1 through ANSI Z535.5.
2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE.

C. Description:

1. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
2. Overall Thickness: 5 mils (0.125 mm).
3. Foil Core Thickness: 0.35 mil (0.00889 mm).
4. Weight: 28 lb/1000 sq. ft. (13.7 kg/100 sq. m).
5. 3-inch (75-mm) Tensile According to ASTM D 882: 70 lbf (311.3 N), and 4600 psi (31.7 MPa).

2.3 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Warning label and sign shall include, but are not limited to, the following legends:

1. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."
2. Arc-Flash Warning: WARNING – ARC-FLASH HAZARD EXISTS WHEN WORKING ON THIS ENERGIZED EQUIPMENT."

2.4 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16-inch (1.6-mm) thick for signs up to 20 sq. inches (129 sq. cm) and 1/8-inch (3.2-mm) thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.5 EQUIPMENT IDENTIFICATION LABELS

A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8-inch (10-mm).

2.6 CABLE TIES

A. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, self-locking.

1. Minimum Width: 3/16-inch (5-mm).
2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 7000 psi (48.2 MPa).
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Negative 50 deg F to positive 284 deg F (Negative 46 deg C to positive 140 deg C).
5. Color: Black.

2.7 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

F. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.

G. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.

H. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

I. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

A. Power-Circuit Conductor Identification, 600 V or Less: For conductors in pull and junction boxes use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase Identification, 600 V or Less: Use colors listed below for ungrounded feeder and branch-circuit conductors.

a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
b. Colors for 240/120-V Circuits:

1) Phase A: Black.
2) Phase B: Red.
3) Neutral: White.
4) Ground: Green.

c. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

B. Install instructional sign, including the color-code for grounded and ungrounded conductors, using adhesive-film-type labels.

C. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.

D. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.

1. Comply with 29 CFR 1910.145.
2. Identify system voltage with black letters on an orange background.
3. Apply to exterior of door, cover, or other access.

E. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

F. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:

a. Indoor Equipment: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

2. Equipment to Be Labeled:

    a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be engraved, laminated acrylic or melamine label.
    b. Junction Boxes labeled with panel and circuit number.
    c. Enclosed controllers.
    d. Contactors.

END OF SECTION 260553

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Lighting and appliance branch-circuit panelboards.

1.2 DEFINITIONS

A. SVR: Suppressed voltage rating.

B. TVSS: Transient voltage surge suppressor.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of panelboard, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
2. Detail enclosure types and details for types other than NEMA 250, Type 1.
3. Detail bus configuration, current, and voltage ratings.
4. Short-circuit current rating of panelboards and overcurrent protective devices.
5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

1.4 INFORMATIONAL SUBMITTALS

A. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01, include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Keys: Two spares for each type of panelboard cabinet lock.
2. Circuit Breakers Including GFCI and Ground Fault Equipment Protection (GFEP) Types: One spare for each panelboard.

1.7 QUALITY ASSURANCE

A. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NEMA PB 1.

D. Comply with NFPA 70.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Remove loose packing and flammable materials from inside panelboards; keep in heated area until installation.

B. Handle and prepare panelboards for installation according to NEMA PB 1.

1.9 PROJECT CONDITIONS

A. Environmental Limitations:

1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

a. Ambient Temperature: Not exceeding negative 22 deg F (negative 30 deg C) to positive 104 deg F (positive 40 deg C).
b. Altitude: Not exceeding 6600 feet (2000 m).

B. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures within limits specified.
2. Altitude not exceeding 6600 feet (2000 m).

1.10 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

A. Enclosures: Flush- and surface-mounted cabinets.

1. Rated for environmental conditions at installed location.

a. Indoor Dry and Clean Locations, other than inside of the Well House: NEMA 250, Type 1.
b. Other Wet or Damp Indoor Locations including inside of the Well House: NEMA 250, Type 4.

2. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
3. Finishes:

a. Panels and Trim: Steel and galvanized steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
b. Back Boxes: Galvanized steel.

4. Directory Card: Inside panelboard door, mounted in transparent card holder.

B. Incoming Mains Location: Bottom.

C. Phase, Neutral, and Ground Buses:

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Neutral: Isolated neutral bus adequate for feeder and branch-circuit equipment conductors.
3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.

D. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Main and Neutral Lugs: Mechanical type.
3. Ground Lugs and Bus-Configured Terminators: Mechanical type.

E. Service Equipment Label: NRTL labeled for use as service equipment for panelboards or load centers with one or more main service disconnecting and overcurrent protective devices.

F. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Panelboards shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

C. Mains: Main lugs only.

D. Branch Overcurrent Protective Devices: Plug-in or Bolt-on circuit breakers, replaceable without disturbing adjacent units.

E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
2. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
3. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
4. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:

    a. Standard frame sizes, trip ratings, and number of poles.
    b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
    c. Multipole units enclosed in a single housing or factory assembled to operate as a single unit.

C. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.
1. Fused Switch Features and Accessories: Standard ampere ratings and number of poles.
2. Auxiliary Contacts: One normally open and normally closed contact(s) that operate with switch handle operation.

2.5 ACCESSORY COMPONENTS AND FEATURES

A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.

B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.

C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install panelboards and accessories according to NEMA PB 1.1.

B. Comply with mounting and anchoring requirements specified in Section 260548.16 "Seismic Controls for Electrical Systems."

C. Mount top of trim 74 inches above finished floor unless otherwise indicated.

D. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

E. Install overcurrent protective devices and controllers not already factory installed.

F. Install filler plates in unused spaces.

G. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.

H. Comply with NECA 1.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 260553 "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads after balancing panelboard loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Panelboards will be considered defective if they do not pass tests and inspections.

END OF SECTION 262416

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Weather-resistant receptacles.
3. Snap switches.
4. Wall-switch and exterior occupancy sensors.

1.2 DEFINITIONS

A. GFCI: Ground-fault circuit interrupter.

B. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

1.3 ACTION SUBMITTALS

A. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:

1. Hubbell Incorporated; Wiring Device (Bryant & Hubbell).
2. Leviton Mfg. Company Inc. (Leviton).
3. Pass & Seymour

B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

2.3 STRAIGHT-BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

2.4 GFCI RECEPTACLES

A. General Description:

1. Straight blade, non-feed-through type.
2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.
4. Weather-resistant where required.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

2.5 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

B. Switches, 120/277 V, 20 A:

2.6 WALL PLATES

A. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Stainless steel.
2. Material: Galvanized steel.
3. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum, lockable while-in-use cover.

2.7 FINISHES

A. Device Color:

1. Wiring Devices Connected to Normal Power System: Ivory unless otherwise indicated or required by NFPA 70 or device listing.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:

    a. Cut back and pigtail, or replace all damaged conductors.
    b. Straighten conductors that remain and remove corrosion and foreign matter.
    c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.

6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

3.2 GFCI RECEPTACLES

A. Install non-feed-through-type GFCI receptacles.

3.3 IDENTIFICATION

A. Comply with Section 260553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Test Instruments: Use instruments that comply with UL 1436.
2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

B. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

C. Test straight-blade for the retention force of the grounding blade according to NFPA 99. Retention force shall be not less than 4 oz. (115 g).

D. Wiring device will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

END OF SECTION 262726

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SECTION 262813 - FUSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cartridge fuses rated 600-V ac and less for use in control circuits, enclosed switches and enclosed controllers.
2. Plug fuses rated 125-V ac and less for use in plug-fuse-type enclosed switches and fuseholders.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material, dimensions, descriptions of individual components, and finishes for spare-fuse cabinets. Include the following for each fuse type indicated:

1.3 MATERIALS MAINTENANCE SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than two of each size and type.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NEMA FU 1 for cartridge fuses.

D. Comply with NFPA 70.

E. Comply with UL 248-11 for plug fuses.

1.5 COORDINATION

A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Cooper Bussmann, Inc.
2. Edison Fuse, Inc.
3. Ferraz Shawmut, Inc.
4. Littelfuse, Inc.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

2.3 PLUG FUSES

A. Characteristics: UL 248-11, nonrenewable plug fuses; 125-V ac.

2.4 PLUG-FUSE ADAPTERS

A. Characteristics: Adapters for using Type S, rejection-base plug fuses in Edison-base fuseholders or sockets; ampere ratings matching fuse ratings; irremovable once installed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.

B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.

C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

A. Cartridge Fuses:

1. Motor Branch Circuits: Class RK1 or Class RK5, 200 kAIC, time delay.
2. Control Circuits: Class CC, 200 kAIC, fast acting.

3.3 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.4 IDENTIFICATION

A. Install labels complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION 262813

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SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Nonfusible switches.
3. Enclosures.

1.2 DEFINITIONS

A. NC: Normally closed.

B. NO: Normally open.

1.3 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Enclosed switches and circuit breakers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current ratings (interrupting and withstand, as appropriate).
4. Include evidence of NRTL listing for series rating of installed devices.
5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01, include the following:

1. Manufacturer’s written instructions for testing and adjusting enclosed switches and circuit breakers.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NFPA 70.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Not less than negative 22 deg F (negative 30 deg C) and not exceeding positive 104 deg F (positive 40 deg C).
2. Altitude: Not exceeding 6600 feet (2010 m).

1.8 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. Type GD, General Duty, Single Throw, 240-V ac, 800 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with cartridge or plug fuse interiors to accommodate fuses, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.

2. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
3. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open.

2.2 NONFUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. Type GD, General Duty, Single Throw, 600 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.

2.3 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
2. Outdoor Locations: NEMA 250, Type 3R.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install individual wall-mounted switches with tops at uniform height unless otherwise indicated.

B. Comply with mounting and anchoring requirements specified in Section 260548.16 "Seismic Controls for Electrical Systems."

C. Install fuses in fusible devices.

D. Comply with NECA 1.

3.3 IDENTIFICATION

A. Comply with requirements in Section 260553 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
3. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

D. Enclosed switches will be considered defective if they do not pass tests and inspections.

3.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

END OF SECTION 262816

SECTION 265100 - INTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior LED lighting fixtures.
2. Lighting fixture supports.

B. Related Sections:

1. Section 262726 "Wiring Devices" for manual wall-box dimmers for incandescent lamps.

1.2 DEFINITIONS

A. BF: Ballast factor.

B. CCT: Correlated color temperature.

C. CRI: Color-rendering index.

D. HID: High-intensity discharge.

E. LED: Light-emitting diode.

F. Lumen: Measured output of lamp and luminaire, or both.

G. Luminaire: Complete lighting fixture, including ballast housing if provided.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:

1. Physical description of lighting fixture including dimensions.
2. Energy-efficiency data.
3. Life, output (lumens, CCT, and CRI), and energy-efficiency data for lamps.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.

1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

1.6 COORDINATION

A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products indicated on Drawings or similar by Hubbell or Day-Brite.

2.2 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS

A. Metal Parts: Free of burrs and sharp corners and edges.

B. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.

C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

D. Diffusers and Globes:

1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

a. Lens Thickness: At least 0.125-inch (3.175-mm) minimum unless otherwise indicated.
b. UV stabilized.

2. Glass: Annealed crystal glass unless otherwise indicated.

E. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

2.3 LED LIGHT FIXTURES

A. High-efficiency LEDs, CRI 80 (minimum), color temperature 4000K, rated life to L70 of 50,000 hours (minimum).

B. LED Driver:

1. Electronic driver rated for the number of LEDs in fixture and voltage indicated.
2. UL listed for intended use, i.e. interior or exterior application.
3. Total Harmonic Distortion Rating: Less than 20 percent.
4. Power Factor: 0.90 or higher.

2.4 LIGHTING FIXTURE SUPPORT COMPONENTS

A. Comply with Section 260529 "Hangers and Supports for Electrical Systems" for channel- and angle-iron supports and nonmetallic channel and angle supports.

B. Twin-Stem Hangers: Two, 1/2-inch (13-mm) steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.

C. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Lighting fixtures:

1. Set level, plumb, and square with ceilings and walls unless otherwise indicated.
2. Install lamps in each luminaire.

B. Temporary Lighting: If it is necessary, and approved by Architect, to use permanent luminaires for temporary lighting, install and energize the minimum number of luminaires necessary. When construction is sufficiently complete, remove the temporary luminaires, disassemble, clean thoroughly, install new lamps, and reinstall.

C. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.2 IDENTIFICATION

A. Install labels with panel and circuit numbers on concealed junction and outlet boxes. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

A. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

END OF SECTION 265100

SECTION 311100 - CLEARING AND GRUBBING

PART 1 - GENERAL

1.1 SUMMARY

A. Clearing site of trees, brush, other plant life, deadwood, and surface debris.

B. Topsoil stripping.

C. Disposal of waste.

D. Protecting existing vegetation to remain.

1.2 RELATED WORK

A. Section 312000 “Earth Moving” for soil materials, excavating, backfilling, and site grading.

B. Section 329000 “Landscaping” for finish grading, topsoil, and seeding of disturbed areas.

1.3 SUBMITTALS

A. None required.

1.4 DEFINITIONS

A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of weeds, roots, and other deleterious materials.

1.5 PROJECT CONDITIONS

A. Retain private utility locating service. Locate Owner’s utilities in addition to utility company facilities. Complete, mark, and protect utility locate markings prior to initiating site clearing activities and excavations.

B. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under conditions specified in Division 1 specifications, and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Owner in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Utility Company’s written permission.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PREPARATION

A. Prior to beginning clearing operations, survey and flag clearing and selective clearing limits and clearly flag vegetation to remain for review by Owner.

B. Protect and maintain benchmarks and survey control points from disturbance during construction.

C. Maintain designated site access to Owner occupied facilities.

D. Protect existing site improvements to remain from damage during construction.

1. Restore damaged areas to their original condition, as acceptable to Owner.
2. Repair all damage to existing site and terrain, including ruts, holes, and any areas of disturbed or damaged vegetation. Topsoil and seed in accordance with Section 329000 “Landscaping.”

3.2 CLEARING AND GRUBBING

A. Remove trees and brush to permit installation of new construction to the limits show in the Drawings.

B. All areas planned for the fill pad are to be cleared and grubbed with the surface vegetation removed. Suitable surface vegetation and soil removed shall be stockpiled for use in non-loading, non-traffic areas where reseeding is indicated.

C. Fill depressions caused by clearing and grubbing operations with suitable material, unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding 12-inch loose depth, and compact each layer to a density equal to adjacent original ground.

3.3 TOPSOIL STRIPPING

A. Strip topsoil in construction areas and stockpile for later use.

3.4 REMOVAL

A. Remove and dispose of clearing and grubbing debris.

B. Trim or cover loads leaving site to prevent spillage or debris on public streets.

END OF SECTION 311100

SECTION 312000-EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes:

1. Excavation and grading as required for constructing building sites.
2. Trench excavation.
3. Backfilling.
4. Site grading.
5. Site restoration.
6. Site drainage.
7. Compaction requirements.
8. Testing.

1.2 RELATED WORK

A. Section 311100 “Clearing and Grubbing.”

B. Section 329000 “Landscaping” for finish grading, including seeding of disturbed areas.

1.3 REFERENCES

A. Alaska DOT&PF Standard Specification for Highway Construction (ASSHC).

B. American Association of State Highway Transportation Officials (AASHTO).

C. American Society for Testing and Materials (ASTM).

D. Occupational Safety and Health Administration (OSHA).

1.4 REGULATORY REQUIREMENTS

A. Conform to ASSHC.

1.5 TESTS

A. Tests and analysis of fill materials shall be performed in accordance with ASSHC Section 703.

1.6 DEFINITIONS

A. Backfill: Soil materials used to fill an excavation.

B. Fill: Soil material used to raise existing grades.

C. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.

D. Surface Course: Layer placed above the subbase course for surface treatment.

E. Subbase Course: Layer placed between the subgrade and base course.

F. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

G. Unclassified Excavation: Suitable soil imported from off-site for use as fill or backfill.

H. Suitable Material: Materials which are adequate for use on the project.

I. Excavation: Removal of material encountered above subgrade elevations.

J. Compaction: Tamping soils by hand or machine.

K. Utilities include on-site pipes, utilidors, conduits, ducts, and cables, as well as underground services within buildings.

L. Structures: Buildings, footings, foundations, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

1.7 SUBMITTALS

A. Gradation reports for all selected fill materials: include proctor analyses, and material source locations.

B. Product Data and Sample: For geotextile fabric, insulation board, and all other products to be furnished.

1. Product data shall include manufacturer catalog data, material data safety sheets, and other information necessary to document compliance with this Section.

1.8 PROTECTION

A. Protect existing trees, shrubs, lawns, and other features remaining as a portion of final landscaping.

B. Protect existing benchmarks, structures, and fences from equipment and vehicular traffic.

C. Protect above and below grade utilities which are to remain. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Owner and then only after arranging to provide temporary utility services.

1.9 SUBMITTALS

A. Gradation reports for all imported fill materials include proctor analyses, and material source locations.

B. Product Data and Sample: For all products to be furnished.

1. Product data shall include manufacturer catalog data, material data safety sheets, and other information necessary to document compliance with this Section.

C. Qualifications: for Contractor provided testing agency.

1.10 TESTING AGENCY

A. Contractor shall engage a qualified independent geotechnical engineering testing agency as a part of his work to perform field quality-control testing.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Crushed Aggregate Surface Course: Crushed rock, sand and silt mixture conforming to State of Alaska DOT&PF standard specification E-1 (2004 ASSHC specification), with the following gradation:

Sieve	Percent Passing by Weight
1-inch	100
3/4-inch	70-100
3/8-inch	50-85
No. 4	35-65
No. 8	20-50
No. 50	15-30
No. 200	8-15

B. Subbase: ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM, or a combination of these group symbols; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, organic, and other deleterious matter and containing less than 6 percent by weight of grains finer than the 200 sieve.

C. Topsoil: As specified within Section 329000 “Landscaping”, salvaged from site, or imported as required.

D. Bedding: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 6 percent passing a No. 200 sieve.

E. Material Sources: Material sources for this project have not been designated. It shall be the Contractor’s responsibility to obtain suitable sources for all materials required for this project. Furthermore, it shall be the Contractor’s responsibility to comply with all applicable laws, land use regulations, permits, royalty payments, coordination,

permission, and reclamation or other requirements that may be in effect at the selected material sources.

2.2 UNSUITABLE SOILS

A. ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT, or a combination of these group symbols. Frozen soils, soils containing roots, stumps, or other debris are all considered unsuitable for project use.

2.3 UTILITY LOCATE TAPE

A. Detectable Warning Tape: Polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6-inches wide and 4 mils thick, continuously labeled with description of utility, with metallic core (encased for corrosion protection) detectable by metal detector when tape is buried up to 30 inches deep. Color keyed to utility: Red (electric); Blue (Water Systems)

2.4 RIGID BOARD INSULATION - POLYSTYRENE FOAM

A. Only polystyrene cell foam rated for direct burial is acceptable.

B. The insulation shall have a maximum thermal conductivity of 0.2 BTU in/hr-ft^2-^{o}F and exhibit no greater conductivity with time.

C. Thicknesses shall be as specified on the project drawings.

D. Insulation board shall meet the requirements below:

Characteristic	**Method**	**Result**
Water absorption (Max.)	ASTM C-272	0.3 percent by volume
Compressive strength (Min.)	ASTM D-1621	40 psi, at 5 percent deformation
Nominal Density	ASTM C-355	1.5 - 2.5 pcf
Water vapor permeability (Max.)	ASTM C-355	1.1 perm-in.
Dimensional stability	ASTM D-2126	2 percent
Coefficient of linear expansion		3.5 x 10^{-5} Ft/deg F

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

C. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

3.2 EXCAVATION

A. Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered.

B. Excavate for required work to indicated elevations and dimensions. Trim bottoms to required lines and grades to leave solid base to receive other work.

C. Excavate utility trenches to indicated gradients, lines, depths, and invert elevations of uniform widths to provide a working clearance on each side of pipe. Excavate trench walls vertically.

D. Minimize disturbance of subgrade, and do not excavate beyond areas required to construct structures.

3.3 SUBGRADES

A. Compact subgrades, before backfilling or placing fill, where disturbed by excavation. Do not create additional disturbance with heavy equipment.

B. In the event soft areas are encounter in subgrade excavation as a result of organics or poor unstable soils, the contractor shall notify the Engineer prior to placing geotextile and fill. Additional excavation, at the direction of the Engineer, may be required to stabilize soft areas prior to continuation of pad construction.

C. Stabilize disturbed areas with seed in accordance with Section 322900 “Landscaping.”

3.4 STOCKPILE

A. Stockpile borrow materials and satisfactory soil materials, without intermixing, in shaped, graded, drained, and covered stockpiles. Stockpile soil materials away from edge of excavations and outside drip line of remaining trees.

3.5 UTILITY TRENCH BACKFILL

A. Place, compact, and shape bedding course to provide continuous support for buried utilities.

B. Place and compact bedding course to a height as shown on plans. Place and compact backfill material to final subgrade.

C. Place locate tape above centerline of pipe as shown on Drawings. Retain in place during placement of fill.

3.6 FILL

A. Place and compact fill material in layers to required elevations.

B. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.

1. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.7 COMPACTION

A. Place backfill and fill materials in layers not more than 12 inches in loose depth for material compacted by heavy compaction equipment, and not more than 6 inches in loose depth for material compacted by hand-operated tampers.

B. Compact soil, all except topsoil, to not less than 95 percent of maximum dry unit weight according to ASTM D 1557:

1. Under new structures, drives, aprons and walkways at 95 percent.

3.8 FREQUENCY OF COMPACTION TESTS

A. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

B. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; compact and retest until specified compaction is obtained.

C. Testing agency shall test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests shall be performed at the following locations and frequencies:

1. Structural Compaction Tests. The following density tests are required beneath structures. The number of tests shall apply to each layer of material placed. Area and frequency are as follows:

a. A minimum of two tests or one test for each 150 sq. ft. of area, whichever will provide the greatest number of tests.

2. Utility Systems Compaction Tests. The number of density test required for backfill in utility trenches shall conform to the following:

a. Bedding Layers under Utilities: One test per 200 feet of trench or a minimum of two tests, whichever is greater.
b. Trench Backfill in Graded Areas: Minimum of two tests per layer or one test per layer for each 300 feet of trench, whichever provides the greatest number of tests.
c. Trench Backfill in Traffic areas: Minimum of two tests per layer or one test per layer for each 100 feet of trench, whichever provides the greatest number of tests.

3. Roadway, driveway, parking and miscellaneous area compaction tests. The number of density tests required for roadways and parking areas, shall conform to the following requirements for each layer of material placed:

a. Subbase and Base Course: A minimum of four tests or one test for each 300 feet of length or 3000 sq. ft. of area, whichever provides the greatest number of tests.
b. Subgrade and Unclassified Fill: A minimum of four tests or one test for each 600 feet of length or 4000 sq. ft. of area, per layer, whichever provides the greatest number of tests.
c. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; compact and retest until specified compaction is obtained.

3.9 GRADING

A. Uniformly grade areas to a smooth surface, free from irregular surface changes.

B. Subbase and Surface Courses: Place subbase course on prepared subgrade. Place surface course material over subbase. Compact to required grades, lines, cross sections.

3.10 SITE RESTORATION AND REPAIR

A. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction.

B. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

C. Uniformly re-grade surface areas of demolition site to a smooth surface. Provide a smooth transition between adjacent existing grades and new grades. Minimize relocation of existing materials from their existing general location.

3.11 DISPOSAL

A. Trash, garbage, construction debris and all regulated wastes shall be legally disposed of off Owner’s property.

3.12 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general plan location, profile alignment, and arrangement of aboveground and underground utility piping. Location and arrangement of piping is intended to take into account site design considerations and constraints, minor field adjustments are anticipated and are subject to Engineer’s approval. Install piping as indicated, to extent practical. Where specific installation detail is not indicated, follow piping manufacturer's written instructions.

B. Install gravity piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.

END OF SECTION 312000

SECTION 329000 - LANDSCAPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Topsoil and Seed.
2. Stabilization of disturbed areas by seeding.
3. Landscape maintenance.

1.2 RELATED WORK

1. Section 311100 “Clearing and Grubbing” for topsoil stripping and site clearing requirements.
2. Section 312000 "Earth Moving" for site grading.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product certificates signed by manufacturers certifying that their products comply with specified requirements.

1. Manufacturer's certified analysis for standard products.
2. Analysis for other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
3. Label data substantiating that planting materials comply with specified requirements.

C. Certification of grass seed from seed vendor for each grass-seed mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of seed mixture, identifying seed source, including name and telephone number of supplier.

D. Material test reports from qualified independent laboratory, stating recommended quantities of soil amendments to be applied, including lime and fertilizer for:

1. Analysis of existing salvaged topsoil materials if any.
2. Analysis of imported topsoil materials.

E. Planting schedule indicating anticipated dates and locations for each type of planting.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed landscaping work similar in material, design, and extent to that indicated for this Project and with a record of successful landscape establishment.

B. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of topsoil.

1. Report suitability of topsoil for lawn growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce a satisfactory topsoil.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery and while stored at site.

B. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

1.6 PROJECT CONDITIONS

A. Utilities: Determine location of above grade and underground utilities and perform work in a manner which will avoid damage. Hand excavate, as required. Maintain grade stakes until removal is mutually agreed upon by parties concerned.

B. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Owner before planting.

1.7 JOB CONDITIONS

A. Planting is not permitted during the following conditions, unless otherwise approved:

1. Cold Weather: When air and ground temperature is less than 35 degrees Fahrenheit (35 degrees F).
2. Wet weather: When ground is saturated.
3. Windy Weather: When wind velocity is greater than 30 mph.

1.8 COORDINATION AND SCHEDULING

A. Seeding to be performed between June 1st and August 15th.

1.9 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract

Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

1.10 REGULATORY REQUIREMENTS

A. Comply with all requirements of the State of Alaska Department of Environmental Conservation concerning application of herbicides, pesticides, and insecticides.

B. All materials used shall conform to all local, state, or federal regulations controlling the use of chemicals, sprays, or other toxic materials. Required permits or certifications for use of "restricted" materials shall be obtained by the Contractor. Proof of Certification shall be provided.

PART 2 - PRODUCTS

2.1 TOPSOIL

A. Topsoil: ASTM D5268, ASTM D422, ASTM D2974; pH range of 5.5 to 7, free of stones and other extraneous materials harmful to plant growth, with the following composition. Mixing of sand, silt, and organic materials to achieve the required composition is acceptable.

1. 30 to 50 percent by volume organic material.
2. 20 to 30 percent by volume silt.
3. 30 to 40 percent by volume sand.
4. The finished topsoil shall not contain more than 4 percent stones larger than 1/4-inch in any dimension.

B. Topsoil Source: Supplement salvaged onsite topsoil with imported topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep or manufacture; do not obtain from agricultural land, bogs, or marshes.

2.2 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances

B. Provide certified grass-seed blends or mixes, proportioned by weight, as follows, for all seeded areas:

Name	Proportion by Weight	Purity	Germination
Norcoast Bering Hairgrass	60 percent	90 percent	85 percent
Arctared Red Fescue	50 percent	90 percent	85 percent
Kenai Polargrass	10 percent	90 percent	85 percent

2.3 FERTILIZER

A. Fertilizer: Commercial grade complete fertilizer of neutral character consisting of fast and slow release nitrogen, 50 percent derived from natural organic source of urea form, phosphorus, and potassium in the following composition: 10-10-10

1. 10 percent Nitrogen, 10 percent phosphorous and 10 percent potassium ratio, and application rate as recommended by qualified soil testing agency.

B. Lime: ASTM C 602 agricultural dolomitic limestone, prilled. Application rate as determined by qualified soil testing agency.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive seeding for compliance with requirements and for conditions affecting performance of work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Lay out locations, stake locations, outline areas, and secure Owner's acceptance before the start of work. Make minor adjustments as may be required.

3.3 PLANTING SOIL PREPARATION

A. Clean indigenous soil of roots, plants, sods, stones, clay lumps and other extraneous materials harmful to plant growth.

B. Limit subgrade preparation to areas that will be planted in the immediate future.

C. Loosen subgrade to a minimum depth of 4 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous materials.

D. Place and spread topsoil to the depths indicated on the plans.

E. Grade lawn and grass areas to a smooth, even surface with loose, uniformly fine texture. Rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future. Remove trash, debris, stones larger than 1-1/2 inches in any dimension, and other objects that may interfere with planting or maintenance operations.

F. Moisten prepared lawn areas before planting when soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

G. Restore prepared areas if eroded or otherwise disturbed after fine grading and before planting.

3.4 SEEDING NEW LAWNS

A. Apply fertilizer and lime at rates specified by testing agency. Blend into upper 2 to 3 inches of soil.

B. Sow seed with a spreader or a seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

C. Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage.

D. Sow seed at the following rates:

1. Seeding Rate: 2 lb. per 1000 sq. ft.

E. Protect seeded areas against hot, dry weather or drying winds by application of peat or other approved mulch materials within 24 hours of completing seeding operations. Scatter uniformly to a depth of 3/16 inches, roll to a smooth surface, and water.

F. Maintain surface in moist condition until grass has germinated. After germination, water at the rate of 1-inch per week until final acceptance. Do not rely on rain to provide sufficient watering.

G. Any areas which do not show adequate growth in the opinion of the Engineer shall be reseeded.

3.5 CLEANUP AND PROTECTION

A. During landscaping, keep work area in an orderly condition.

B. Protect adjacent facilities from damage due to landscape operations. Protect landscaping from operations by other contractors and trades, erosion, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

3.6 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Place surplus soil including excess subsoil and unsuitable soil in on-site soil disposal area. All trash, surplus soil, and debris shall be legally disposed off-site.

END OF SECTION 329000

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APPENDIX A
PERMITS

PERMIT DESCRIPTION	ISSUE DATE	EXPIRE DATE
State of Alaska, Department of Public Safety, Division of Fire and Life Safety, Letter of Approval to Build. Plan Review # 2015Anch1764	**1/20/2016**	**NA**

THE STATE of ALASKA
GOVERNOR BILL WALKER

Department of Public Safety

DIVISION OF FIRE AND LIFE SAFETY
Plan Review Bureau - Anchorage

5700 East Tudor Road
Anchorage, Alaska 99507-1225
Main: 907.269.2004
Fax: 907.269.0098

January 20, 2016

Edward Soto
SOA Division of Forestry
101 Airport Road
Palmer, AK 99645

SUBJECT:	Copper River Well House - Full Plan Review
CITY:	Glennallen
PLAN REVIEW:	2015Anch1764
TYPE OF CONSTRUCTION:	VB
OCCUPANCY:	U

2009 INTERNATIONAL BUILDING AND FIRE CODE

Dear Edward Soto:

Plans for the Full Plan Review have been reviewed by this office for conformity with the State Fire Safety Regulations and are hereby approved. Enclosed is a certificate of approval that must be posted on the premises until the project has been completed according to the approved plans and all regulations have been adhered to.

Approval of submitted plans is not approval of omissions or oversights by this office or noncompliance with any applicable regulations of the Municipal Government.

It must be understood that the inclusion of and compliance with State Fire Safety Regulations does not preclude the necessity of compliance with the requirements of local codes and ordinances.

If we can be of further assistance in this matter, please feel free to contact us at the address above.

Sincerely,

Jillian Roberts
Plans Examiner

Enclosure: Approval Certificate

State of Alaska
Office of the State Fire Marshal
Plan Review

This is to certify that the plans for this building were reviewed by the *State Fire Marshal* on January 20, 2016 for conformance with AS 18.70.010 -- 100; 13 AAC 50.027.

This certificate shall be posted in a conspicuous place on the premises named Copper River Well House and shall remain posted until construction is completed.

NOTICE: Any changes or modifications to the approved plans **must** be resubmitted for review by the *State Fire Marshal*.

Plan Review #: **2015Anch1764** By: Jillian Roberts

Authority: AS 18.70.080
Form: 12-741
(6/01)

Jillian Roberts
Plans Examiner

Full Plan Review