

CITY OF BETHEL

City Council Meeting Agenda, May 16, 2024 – 12:00 PM

Website: <https://www.cityofbethel.org/council>

Location: Council Chambers, City Hall, 300 Chief Eddie Hoffman Highway, Bethel

Council Members: Mayor Mark Springer, Vice-Mayor Sophie Swope, Rose Henderson, Beth Hessler, Patrick Snow, Teresa Keller, Mikayla Miller

Zoom Meeting Link: <https://us06web.zoom.us/j/4888456188?pwd=bkN1dGI4MHpGZ1kwOUVYWU5kd0xhZz09>

Zoom Meeting ID: 488 845 6188

Zoom Meeting Passcode: 13871

Zoom Meeting Conference Line Numbers: 833 548 0276 US Toll-free

833 548 0282 US Toll-free

877 853 5257 US Toll-free

888 475 4499 US Toll-free



1. CALL TO ORDER

2. PLEDGE OF ALLEGIANCE

3. ROLL CALL

4. PEOPLE TO BE HEARD – FIVE MINUTES PER PERSON

- 4.1. *Written Public Comments can be submitted by opening your phone camera and hovering over this URL code. The link to the submission form will appear. You may also go to www.cityofbethel.org.*



5. APPROVAL OF AGENDA

6. UNFINISHED BUSINESS

7. NEW BUSINESS

- 7.1. AM 24-11: Acting City Manager To Negotiate And Execute Bid For Chemical Storage Building From Bethel Contracting, LLC. With Lowest Bid Of \$1,349,230.00 (Acting City Manager Arnold)

8. ADJOURNMENT

Posted May 13, 2024 at AC Co., Swanson's, City Hall, and the Post Office.

Kevin Morgan, Deputy City Clerk

City Clerk's Office Contact Information: Email cityclerk@cityofbethel.net Phone 907-543-1384

Items noted with an asterisk (*) are consent agenda items, unless removed from the consent agenda they are approved upon the approval of the agenda. Ordinances introduced at this meeting may be set for public hearing at the next regular meeting.

The Council may by unanimous consent, after 12:00 AM Fix the Time to Which To Adjourn until the following day at 6:30 PM

City of Bethel Action Memorandum

Action memorandum No.	24-11		
Date action introduced:	May 16, 2024	Introduced by:	Acting City Manager Arnold
Date action taken:		Approved	Denied
Confirmed by:			

Action Title: Acting City Manager To Negotiate And Execute Bid For Chemical Storage Building From Bethel Contracting, LLC. With Lowest Bid Of \$1,349,230.00

Attachment(s) (1) Request for Bids – Chemical Storage Building, Prepared by DOWL, LLC (2) Chemical Storage Building Bid Tabulation Form.

Department/Individual:	Initials:	Remarks:
Administration William Arnold, Acting City Manager	WA	
Purchasing Agent, Carmen Murat	CM	

Account information:	Amount of fiscal impact:
	1,349,230.00

Summary Statement

The City of Bethel had DOWL prepare and issue a Request for Bids document for the construction of the Chemical Storage Building with the Bid submission deadline of April 29, 2024. The City received two Bids from Company A and Company B by the deadline from qualified contractors in the state of Alaska, specifically with qualifications to work in the YK Delta. Bethel Contracting, LLC. entered the lowest bid with all Request for Bid requirements attached.

BID TABULATION FORM							
OWNER		City of Bethel, Bethel, Alaska					
PROJECT		Chemical Storage Building Phase 2, Building Construction					
Contract No.							
Bid Opening		Tuesday, April 23, 2024 at 12:00PM					
	1	2	3	4	5	6	6
Bidder	Bethel Contracting	UIC Construction, LLC					
Date Received	4/23/2024	4/23/2024					
Time Received	11:29am	11:34am					
Bid Received by	Purchasing Agent	Purchasing Agent					
Acknowledge Addenda							
Addendum 1 issued April 3, 2024	Y	Y					
Addendum 2 issued April 9, 2024	Y	Y					
Addendum 3 issued April 16, 2024	Y	Y					
Required Attachments*							
Bid Form (00 41 13)	Y	Y					
Bid Bond (C-430)	Y	Y					
List of Subcontractors	Y	Y					
List of Suppliers	Y	Y					
List of Project References	Y	Y					
Evidence of Authority to do Business in AK	Y	Y					
Contractor's License #	CONE35958	CONE28676					
Qualification Statement	Y	Y					
Verification of Anti-Collusion	Y	Y					
Local Bidder Support [if applicable]		Y					
Bid Tabulation							
Base Bid	\$ 1,349,230.00	\$ 1,433,859.00	\$ -	\$ -	\$ -	\$ -	\$ -
	0% Reduction	5% Reduction					
Base Bid Total with Local Bidder Reduction (not for Contract Value)	\$ 1,349,230.00	\$ 1,362,166.05	\$ -	\$ -	\$ -	\$ -	\$ -
RANK	1	2					
*Subject to review for compliance, post Bid Opening							
Bid Opened By:	Carmen Murat		Witnessed By:			William Arnold	

**CITY OF BETHEL
BETHEL, ALASKA**



REQUEST FOR BIDS

**Chemical Storage Building Phase 2
Building Construction**

Deadline for Questions/ Protests: Wednesday, April 10, 2024, at 12:00 pm
Opening/ Due Date: Friday, April 19, 2024, at 12:00 pm
Opening Time: 12:00 pm
Opening Place: City of Bethel – City Hall
300 Chief Eddie Hoffman Highway
Bethel, Alaska 99559

BID DOCUMENTS TABLE OF CONTENTS

DIVISION 00 PROCUREMENT AND CONTRACTING REQUIREMENTS

00 11 13	Advertisement For Bids
00 21 13	Instruction to Bidders
00 41 13	Bid Form
00 43 13	Bid Bond (EJCDC C-430, 2013 edition)
00 52 13	Agreement Between Owner and Contractor for Construction Contract (EJCDC C-520, 2013 edition)
00 61 13.13	Performance Bond (EJCDC C-610, 2013 edition)
00 61 13.16	Payment Bond (EJCDC C-615, 2013 edition)
00 72 13	Standard General Conditions of the Construction Contract (EJCDC C-700, 2013 edition)
00 80 00	Supplementary Conditions (EC-800)

DIVISION 01 GENERAL REQUIREMENTS

01 00 00	General Requirements
01 00 01	Method of Measurement and Basis of Payment

DIVISION 03 CONCRETE

03 30 00	Cast-In-Place Concrete
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DIVISION 05 METALS

05 12 00	Structural Steel Framing
05 31 00	Steel Decking
05 40 00	Cold-Formed Metal Framing

DIVISION 07 THERMAL AND MOISTURE PROTECTION

07 41 16	Insulated Metal Roof Panels
07 42 13.13	Formed Metal Wall Panels
07 42 93	Soffit Panels
07 72 53	Snow Guards

DIVISION 08 OPENINGS

08 11 13	Hollow Metal Doors and Frames
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DIVISION 21 FIRE SUPPRESION

21 13 13	Fire Sprinkler Systems
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DIVISION 22 PLUMBING

22 05 00	Common Work Results for Plumbing
22 05 29	Hangers and Supports for Plumbing Piping and Equipment
22 11 00	Facility Water Distribution

22 13 00 Facility Sanitary Sewerage

DIVISION 23 HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

23 05 00 Common Work Results for Mechanical
23 05 29 Hangers and Supports for HVAC Piping and Equipment
23 10 00 Fuel-oil System
23 20 00 HVAC Piping and Pumps
23 31 00 HVAC Ducts and Casings
23 34 00 HVAC Fans
23 52 23 Cast Iron Boilers & Accessories
23 82 00 Hydronic Terminal Heating Units

DIVISION 26 ELECTRICAL

26 00 00 Electrical Work, General
26 05 19 Wire and Cables
26 05 26 Grounding
26 05 33 Electrical Raceway Systems
26 24 16 Panelboards
26 27 26 Wiring Devices
26 28 16 Switches and Circuit Breakers
26 29 13 Motor Controllers
26 50 00 Lighting

DIVISION 28 ELECTRONIC SAFETY AND SECURITY

28 31 76 Conventional Fire Alarm System

DIVISION 31 EARTH WORK

31 20 00 Earth Moving

DIVISION 33 UTILITIES

33 07 00 HDPE Insulated Pipe and Fittings
33 12 13 Water And Sewer Service Connections
33 13 00 Disinfecting of Water Piping

SIGNATURE AND VERIFICATION OF ANTI-COLLUSION

ENGINEERING DOCUMENTS

Chemical Storage Building Phase 2 Drawings
Geotechnical Investigation and Recommendations

SUPPLEMENTAL INFORMATION

Bethel Public Works Yard – Institutional Controls
Project Contract Forms

END TABLE OF CONTENTS

**SECTION 00 11 13
ADVERTISEMENT FOR BIDS**

**CITY OF BETHEL
BETHEL, ALASKA**

**CHEMICAL STORAGE BUILDING PHASE 2
BUILDING CONSTRUCTION**

The City of Bethel (Owner) is seeking separate sealed Bids for construction of Phase 2 of a new Chemical Storage Building (Project). Phase 2 will construct the facility. Bids will be received by the Purchasing Agent at City Hall, located at 300 Chief Eddie Hoffman Highway (or PO Box 1388), Bethel, Alaska 99559, until 12:00 PM local time on Friday, April 19, 2024 at which time the Bids received will be publicly opened and read.

The Project includes construction of a steel frame warehouse with concrete slab foundation for storage of chemicals used by the Owner.

Bids will be received for a single prime Contract. Bids shall be developed on a lump sum basis with a schedule of values following bidding as indicated in the Bid Form and Method of Measurement and Basis of Payment.

The Issuing Office for the Bidding Documents is:

City of Bethel
C/O Purchasing Agent
Bethel, Alaska 99559
Email: purchasingagent@cityofbethel.net

Prospective Bidders may examine the Bidding Documents at the Issuing Office on Monday through Friday between the hours of 8:00 AM and 5:00 PM and may obtain copies of the Bidding Documents from the Issuing Office.

The Issuing Office has established a Bidding Documents Website:

<https://www.cityofbethel.org/rfps>

Bidding Documents may be downloaded from the designated website. The designated website, and only the designated website, will be updated when necessary with addenda, lists of registered plan holders, and other information relevant to submitting a Bid for the Project.

Bidding Documents may also be examined at The Plans Room LLC (4831 Old Seward Highway, Suite 202, Anchorage, Alaska), The Association of General Contractors (8005 Schoon Street, Anchorage, Alaska), and AGC/The Plans Room (3750 Bonita Street, Fairbanks, Alaska) on Monday through Friday between the hours of 9:00 AM and 4:00 PM; and the office of the Engineer, DOWL (5015 Business Park Boulevard, Suite 4000, Anchorage, Alaska), on Monday through Friday between the hours of 8:00 AM and 5:00 PM.

Each bid must be submitted and sealed in an envelope addressed to City of Bethel C/O Purchasing Agent, Bethel, Alaska 99559 and plainly marked on the outside of the envelope as "Bid for City of Bethel, Chemical Storage Building Phase 2 – Building Construction" and the date and hour of the bid opening. In person bids will be accepted from 11:30 AM to 12:00 PM at

the entrance to City Hall (at 300 Chief Eddie Hoffman Highway). Bids may also be mailed to PO Box 1388, Bethel, Alaska 99559, or emailed to the Purchasing Agent.

The prevailing wage rates of the State of Alaska Department of Labor and Safety for Laborers' & Mechanics Minimum Rates of Pay (Pamphlet 600) apply to this project and are hereby incorporated by reference as if fully set forth herein.

The successful Bid shall comply with each provision thereof. Each Bid will be reviewed by the Owner and Engineer for compliance and completeness. Bidders must be in good standing with the City of Bethel. The winning bid will be selected based on the lowest, responsive, qualified bid. Local Bids will receive a five percent (5%) preference in determining the lowest responsible and responsive bid.

The City of Bethel will not be liable for any costs incurred by any Bidder in response to this advertisement. The City of Bethel reserves the right to reject any or all bids without cause.

All questions should be submitted in writing to the Purchasing Agent at purchasingagent@cityofbethel.net

END OF ADVERTISEMENT FOR BIDS

SECTION 00 21 13
INSTRUCTIONS TO BIDDERS
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ARTICLE 1 – DEFINED TERMS

1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:

- A. *Issuing Office* – The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered.

City of Bethel
C/O Purchasing Agent
Bethel, Alaska 99559
purchasingagent@cityofbethel.net

- B. *Local Bidder* – A local bidder means a business that submits a bid with fixed offices or distribution points located within the boundaries of the City of Bethel and who has a current City of Bethel business license and who is at the time bidding in compliance with all requirements of the City of Bethel sales tax ordinance. A Bethel post office box number or residential address may not be used solely to establish status as a local bidder. The Owner reserves the final right to determine local bidder status.

ARTICLE 2 – BIDDING DOCUMENTS

- 2.01 Bidder shall obtain a complete set of Bidding Requirements and proposed Contract Documents (together, the Bidding Documents). See the Agreement for a list of the Contract Documents. It is Bidder's responsibility to determine that it is using a complete set of documents in the preparation of a Bid. Bidder assumes sole responsibility for errors or misinterpretations resulting from the use of incomplete documents, by Bidder itself or by its prospective Subcontractors and Suppliers.
- 2.02 Bidding Documents are made available for the sole purpose of obtaining Bids for completion of the Project and permission to download or distribution of the Bidding Documents does not confer a license or grant permission or authorization for any other use. Authorization to download documents, or other distribution, includes the right for plan holders to print documents solely for their use, and the use of their prospective Subcontractors and Suppliers, provided the plan holder pays all costs associated with printing or reproduction. Printed documents may not be re-sold under any circumstances.
- 2.03 Owner has established a Bidding Documents Website as indicated in the Advertisement or invitation to bid. Owner recommends that Bidder obtain a complete set of the Bidding Documents from such website. Bidders may rely that sets of Bidding Documents obtained from the Bidding Documents Website are complete, unless an omission is blatant.
- 2.04 Plan rooms (including construction information subscription services, and electronic and virtual plan rooms) may distribute the Bidding Documents or make them available for examination. Owner is not responsible for omissions in Bidding Documents or other documents obtained from plan rooms, or for a Bidder's failure to obtain Addenda from a plan room.

2.05 Electronic Documents

- A. When the Bidding Requirements indicate that electronic (digital) copies of the Bidding Documents are available, such documents will be made available to the Bidders as Electronic Documents in the manner specified.
 - 1. Bidding Documents will be provided in Adobe PDF (Portable Document Format) (.pdf) that is readable by Adobe Acrobat Reader Version 2017 or later. It is the intent of the Engineer and Owner that such Electronic Documents are to be exactly representative of the paper copies of the documents. However, because the Owner and Engineer cannot totally control the transmission and receipt of Electronic Documents nor the Contractor's means of reproduction of such documents, the Owner and Engineer cannot and do not guarantee that Electronic Documents and reproductions prepared from those versions are identical in every manner to the paper copies.
- B. Unless otherwise stated in the Bidding Documents, the Bidder may use and rely upon complete sets of Electronic Documents of the Bidding Documents, described in Paragraph 2.06.A above. However, Bidder assumes all risks associated with differences arising from transmission/receipt of Electronic Documents versions of Bidding Documents and reproductions prepared from those versions and, further, assumes all risks, costs, and responsibility associated with use of the Electronic Documents versions to derive information that is not explicitly contained in printed paper versions of the documents, and for Bidder's reliance upon such derived information.

ARTICLE 3 – QUALIFICATIONS OF BIDDERS

- 3.01 To demonstrate Bidder's qualifications to perform the Work, Bidder shall submit with its Bid (a) written evidence establishing its qualifications such as financial data, previous experience, and present commitments, and (b) the following additional information:
 - A. Evidence of Bidder's authority to do business in the state or jurisdiction of where the Project is located,
 - B. Alaska Contractor's License No.,
 - C. List of proposed Subcontractor(s),
 - D. List of proposed Supplier(s),
 - E. Required Bid security in the form of a Bid Bond (EJCDC No. C-430, 2013),
 - F. List of similar projects over the past five years in the Yukon-Kuskokwim Delta Region including location, size, owner contact name, and telephone, and
 - G. If Bidder is a Local Bidder, a signed letter stating status as a Local Bidder must be provided and the Bidder must show compliance with the definition of a local bidder as found in Article 1 of this section.
- 3.02 Bidders must be in good standing with the Owner. Good standing includes but is not limited to:
 - A. No outstanding debts, fees, payments, or taxes owed to the Owner.

- B. No outstanding claims between the Owner and Bidder, and
 - C. No previous history of default of duty, contract, or obligation to the Owner.
- 3.03 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.
- 3.04 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.
- 3.05 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

ARTICLE 4 – SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

4.01 *Site and Other Areas*

- A. The Site is identified in the Bidding Documents. By definition, the Site includes rights-of-way, easements, and other lands furnished by Owner for the use of the Contractor. Any additional lands required for temporary construction facilities, construction equipment, or storage of materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by the Contractor.

4.02 *Existing Site Conditions*

- A. Subsurface, Physical, and Hazardous Environmental Conditions
 - 1. The Supplementary Conditions identify:
 - a. One report known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site – please see Engineering Documents.
 - b. One report know to Owner of contaminated sites at or adjacent to the Site – please see Supplemental Information.
 - 2. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.
 - 3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.
- B. Adequacy of Data: Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraphs 5.03, 5.04, and 5.05 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or

Specifications or identified in the Contract Documents to be within the scope of the Work, appear in Paragraph 5.06 of the General Conditions.

4.03 *Site Visit and Testing by Bidders*

- A. Bidder shall conduct a voluntary Site visit during normal working hours and shall not disturb any ongoing operations at the Site.
- B. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.
- C. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site.
- D. Bidder shall comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.
- E. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

4.04 *Owner's Safety Program*

- A. Site visits and work at the Site may be governed by an Owner safety program. As the General Conditions indicate, if an Owner safety program exists, it will be noted in the Supplementary Conditions.

4.05 *Other Work at the Site*

- A. Reference is made to Article 8 of the Supplementary Conditions for the identification of the general nature of other work of which Owner is aware (if any) that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) and relates to the Work contemplated by these Bidding Documents. If Owner is party to a written contract for such other work, then on request, Owner will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other confidential matters), if any.

ARTICLE 5 – BIDDER'S REPRESENTATIONS

5.01 It is the responsibility of each Bidder before submitting a Bid to:

- A. Examine and carefully study the Bidding Documents, and any data and reference items identified in the Bidding Documents;
- B. Visit the Site, conduct a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfy itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;

- C. Become familiar with and satisfy itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work;
- D. Carefully study all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings;
- E. Consider the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs;
- F. Agree, based on the information and observations referred to in the preceding paragraph, that at the time of submitting its Bid no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;
- G. Become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;
- H. Promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder;
- I. Determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work; and
- J. Agree that the submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 6 – INTERPRETATIONS AND ADDENDA

- 6.01 Owner on its own initiative may issue Addenda to clarify, correct, supplement, or change the Bidding Documents.
- 6.02 Bidder shall submit all questions about the meaning or intent of the Bidding Documents to the Purchasing Agent in writing. Contact information and submittal procedures for such questions are as follows:

City of Bethel
C/O Purchasing Agent
Email: purchasingagent@cityofbethel.net

- 6.03 Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all registered plan holders. Questions received less than seven days prior to the date for opening of Bids may not be answered.
- 6.04 Only responses set forth in an Addendum will be binding. Oral and other interpretations or clarifications will be without legal effect. Responses to questions are not part of the Contract Documents unless set forth in an Addendum that expressly modifies or supplements the Contract Documents.

ARTICLE 7 – BID SECURITY

- 7.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of five percent (5%) of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a certified check, bank money order, or a Bid bond (on the form included in the Bidding Documents) issued by a surety meeting the requirements of Paragraphs 6.01 and 6.02 of the General Conditions.
- 7.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract Documents, furnished the required contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited. Such forfeiture shall be Owner's exclusive remedy if Bidder defaults.
- 7.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Contract or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.
- 7.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within seven days after the Bid opening.

ARTICLE 8 – CONTRACT TIMES

- 8.01 The number of days within which, or the dates by which, the Work is to be substantially completed and ready for final payment are set forth in the Agreement.

ARTICLE 9 – LIQUIDATED DAMAGES

- 9.01 Provisions for liquidated damages, if any, for failure to timely attain Substantial Completion or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 10 – SUBSTITUTE AND “OR-EQUAL” ITEMS

- 10.01 The Contract for the Work, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, and those “or-equal” or substitute materials and equipment subsequently approved by Engineer prior to the submittal of Bids and identified by Addendum. No item of material or equipment will be considered by Engineer as an “or-equal” or substitute unless written request for approval has been submitted by Bidder and has been received by Engineer at least 15 days prior to the date for receipt of Bids in case of a proposed substitute and 5 days prior in the case of a proposed “or equal”. Each such request shall comply with the requirements of Paragraphs 7.04 and 7.05 of the General Conditions. The burden of proof of the merit of the proposed item is upon Bidder. Engineer’s decision of approval or disapproval of a proposed item will be final. If Engineer approves any such proposed item, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon approvals made in any other manner. Substitutes and “or-equal” materials and equipment may be proposed by Contractor in accordance with Paragraph 7.04 and 7.05 of the General Conditions after the Effective Date of the Contract.
- 10.02 All prices that Bidder sets forth in its Bid shall be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of “or-equal” or substitution requests are made at Bidder’s sole risk.

ARTICLE 11 – SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 11.01 The apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to Owner a list of the Subcontractors or Suppliers proposed for the Work.
- If requested by Owner, such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, or other individual or entity. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder shall submit a substitute, Bidder’s Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.
- 11.02 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, or other individuals or entities. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.06 of the General Conditions.
- 11.03 Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom Contractor has reasonable objection.

- 11.04 The Contractor shall not award work to Subcontractor(s) in excess of the limits stated in SC 7.06.

ARTICLE 12 – PREPARATION OF BID

- 12.01 The Bid Form is included with the Bidding Documents.
- A. All blanks on the Bid Form shall be completed in ink and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.
 - B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words “No Bid” or “Not Applicable.”
- 12.02 A Bid by a corporation shall be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation shall be shown.
- 12.03 A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership shall be provided on the Bid Form.
- 12.04 A Bid by a limited liability company shall be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown.
- 12.05 A Bid by an individual shall show the Bidder’s name and official address.
- 12.06 A Bid by a joint venture shall be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The official address of the joint venture shall be shown.
- 12.07 All names shall be printed in ink below the signatures.
- 12.08 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.
- 12.09 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.
- 12.10 The Bid shall contain evidence of Bidder’s authority and qualification to do business in the state where the Project is located, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder’s state contractor license number, if any, shall also be shown on the Bid Form.

ARTICLE 13 – BASIS OF BID

13.01 *Lump Sum*

- A. Bidders shall submit a Bid on a lump sum basis for each item of Work listed in the bid price section of the Bid Form.

- B. The “Bid Price” (sometimes referred to as the extended price) for each lump sum Bid item will be the “Bid Lump Sum Price” offered by the Bidder. The total of all lump sum Bid items will be the sum of these “Bid Prices”; such total will be used by Owner for Bid comparison purposes. The final quantities and Contract Price will be determined in accordance with Paragraph 13.03 of the General Conditions.
 - C. Discrepancies between the multiplication of units of Work and lump sum prices will be resolved in favor of the lump sum prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.
- 13.02 Per the City of Bethel Municipal Code Chapter 4.20 Purchasing, local Bidders submitting a bid shall receive a five percent (5%) preference in determining the lowest responsible and responsive bid.

ARTICLE 14 – SUBMITTAL OF BID

- 14.01 With each copy of the Bidding Documents, a Bidder is furnished one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of Article 7 of the Bid Form.
- 14.02 A Bid shall be received no later than the date and time prescribed and at the place indicated in the Advertisement for Bid and shall be enclosed in a plainly marked package with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation “BID ENCLOSED.” When using the mail or other delivery system, the Bidder is totally responsible for the mail or other delivery system delivering the Bid at the place and prior to the time indicated in the Advertisement for Bid. A mailed Bid shall be addressed to City of BethelC/O: Purchasing Agent, PO BOX 1388, Bethel, Alaska 99559.
- 14.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted.

ARTICLE 15 – MODIFICATION AND WITHDRAWAL OF BID

- 15.01 A Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- 15.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 16.01 and submit a new Bid prior to the date and time for the opening of Bids.
- 15.03 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that

there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned.

ARTICLE 16 – OPENING OF BIDS

- 16.01 Bids will be opened at the time and place indicated in the advertisement or invitation to bid and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

ARTICLE 17 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 17.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 18 – EVALUATION OF BIDS AND AWARD OF CONTRACT

- 18.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible. If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, then the Owner will reject the Bid as nonresponsive; provided that Owner also reserves the right to waive all minor informalities not involving price, time, or changes in the Work.
- 18.02 If Owner awards the contract for the Work, such award shall be to the responsible Bidder submitting the lowest responsive Bid.
- 18.03 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.
- 18.04 Evaluation of Bids
- A. In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.
 - B. For the determination of the apparent low Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price Bid for that item, together with any lump sum items.
- 18.05 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.
- 18.06 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed

Subcontractors, Suppliers, individuals, or entities to perform the Work in accordance with the Contract Documents.

ARTICLE 19 – BONDS AND INSURANCE

- 19.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the Agreement (executed by Successful Bidder) to Owner, it shall be accompanied by required bonds and insurance documentation.

ARTICLE 20 – SIGNING OF AGREEMENT

- 20.01 When Owner issues a Notice of Award to the Successful Bidder, it shall be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement. Within 15 days thereafter, Successful Bidder shall execute and deliver the required number of counterparts of the Agreement (and any bonds and insurance documentation required to be delivered by the Contract Documents) to Owner. Within ten days thereafter, Owner shall deliver one fully executed counterpart of the Agreement to Successful Bidder, together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions.

ARTICLE 21 – CANCELLATION OF BID PROCESS

- 22.01 The City retains the right to cancel the bid process at any point.

ARTICLE 22 – WAGE RATE REQUIREMENTS

- 22.01 The prevailing wage rates of the State of Alaska apply to this contract as do any requirements of the State of Alaska associated with the use of these State prevailing wages.

ARTICLE 23 – BID PROTESTS

- 23.01 A Bidder may protest a bid result in writing to the Owner within (7) seven calendar days of the Bid opening. Any protests received after seven days will not be accepted. Oral protest will not be accepted.
- 23.02 In order for a protest to be granted, a Bidder must prove by preponderance of the evidence that their Bid was the lowest responsive, responsible Bid.

END OF INSTRUCTION TO BIDDERS

**SECTION 00 41 13
BID FORM****TABLE OF CONTENTS**

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ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

City of Bethel
 C/O: Purchasing Agent
 Bethel, Alaska 99559
 Email: purchasingagent@cityofbethel.net

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 – BIDDER’S ACKNOWLEDGEMENTS

2.01 Bidder accepts all the terms and conditions of the Advertisement and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 – BIDDER’S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

- A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

<u>Addendum No.</u>	<u>Addendum Date</u>
_____	_____
_____	_____
_____	_____
_____	_____

- B. Bidder has visited the Site and become familiar with and satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Bidder is familiar with and has satisfied itself as to all federal, state and local Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

- E. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.
- F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents and confirms that the written resolution thereof by Engineer is acceptable to Bidder.
- I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.
- J. Bidder will submit written evidence of its authority to do business in the State or other jurisdiction where the Project is located not later than the date of its execution of the 00 52 13 Agreement.
- K. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 4 – BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
 - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process;

2. “fraudulent practice” means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 3. “collusive practice” means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
 4. “coercive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.
- E. Bidder has not been contacted by any City employee or City Council member for purposes of influencing the City’s bid decision.
 - F. If selected, Bidder will not engage in discriminating against any person because of race, national origin, color, age, creed, religion, sex, sexual orientation, gender identity, political affiliation, marital status, ancestry, disability, or status as a disabled veteran.
 - G. Bidder’s failure to certify to the statements in this section shall result in automatic rejection of the bid.
 - H. If Bidder is found to have been in violation of any of the statements in this section, City shall automatically reject the bid.
 - I. City may cancel a contract if, during the course of such contract, the City finds Bidder to be in violation of any of the sworn statements required by this section.

ARTICLE 5 – BASIS OF BID

- 5.01 Bidder will complete the Work in accordance with the Contract Documents as itemized in the following Bid Schedule:

Item No.	Description	Unit	Bid Amount
101	Mobilization and Demobilization	Lump Sum	\$
102	Construction Survey and Record Drawings	Lump Sum	\$
103	Installation of Chemical Storage Building	Lump Sum	\$
104	Startup/Commissioning of Mechanical Systems and O&M Manuals	Lump Sum	\$
TOTAL			\$

- 5.02 Bidder acknowledges that:

- A. Each Bid Lump Sum Price includes an amount considered by Bidder to be adequate to cover Contractor’s overhead and profit for each separately identified item.

- B. Bidder will comply with State of Alaska Wage Rates.
- C. If Bidder wishes to submit manufacturer's data for a product for preliminary approval, the bidder must submit the manufacturer's data no later than when questions are due. Preliminary approvals will be granted on a case-by-case basis and are not guaranteed. Preliminary approvals are not to take the place of the submittal review and approval process with the successful bidder.

ARTICLE 6 – TIME OF COMPLETION

- 6.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.
- 6.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 7 – ATTACHMENTS TO THIS BID

- 7.01 The following documents are submitted with and made a condition of this Bid:
 - A. Required Bid Security.
 - B. List of Proposed Subcontractors.
 - C. List of Proposed Suppliers.
 - D. List of Project References, which indicates experience with steel frame and concrete slab construction.
 - E. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such license within the time for acceptance of Bids.
 - F. Contractor's License No.: _____.
 - G. Required Bidder Qualification Statement with supporting data.
 - H. If a local Bidder signed letter stating status as a local Bidder, then show that the Bidder complies with the definition of a local bidder as found in Article 1, Instruction to Bidders.
 - I. Signed and completed Bid Schedule or submittal.
 - J. Signed and dated verification of anti-collusion.

ARTICLE 8 – DEFINED TERMS

- 8.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 9 – BID SUBMITTALBIDDER: *[Indicate correct name of bidding entity]*

By:

[Signature] _____*[Printed name]* _____*(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)*

Attest:

[Signature] _____*[Printed name]* _____

Title: _____

Submittal Date: _____

Address for giving notices:

Telephone Number: _____

Fax Number: _____

Contact Name and e-mail address: _____

Bidder's License No.: _____

(where applicable)

END OF BID FORM

SECTION 00 43 13 BID BOND (PENAL SUM FORM)

Any singular reference to Bidder, Surety, Owner or other party shall be considered plural where applicable.

BIDDER (*Name and Address*):

SURETY (*Name, and Address of Principal Place of Business*):

OWNER (*Name and Address*):

City of Bethel
PO Box 1388
Bethel, Alaska 99559

BID

Bid Due Date: Friday, April 19, 2024

Description (*Project Name— Include Location*): Chemical Storage Building Phase 2 – Building Construction

BOND

Bond Number:

Date:

Penal sum

\$

(Words)

(Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

BIDDER

SURETY

(Seal)

(Seal)

Bidder's Name and Corporate Seal

Surety's Name and Corporate Seal

By:

Signature

By:

Signature (Attach Power of Attorney)

Print Name

Print Name

Title

Title

Attest:

Signature

Attest:

Signature

Title

Title

Note: Addresses are to be used for giving any required notice.

Provide execution by any additional parties, such as joint venturers, if necessary.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation shall be null and void if:
 - 3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
 - 3.2 All Bids are rejected by Owner, or
 - 3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after the Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

SECTION 00 52 13

AGREEMENT

FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

THIS AGREEMENT is by and between City of Bethel, P.O. Box 1388, Bethel, AK 99559 ("Owner") and
("Contractor").

Owner and Contractor hereby agree as follows:

ARTICLE 1 – WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

ARTICLE 2 – THE PROJECT

2.01 *The Project, of which the Work under the Contract Documents is a part, is generally described as follows: All materials, equipment, labor, and related services to construct **a steel frame warehouse and concrete slab foundation for storage of chemicals used by the Owner.***

ARTICLE 3 – ENGINEER

3.01 The Project has been designed by **DOWL, 5015 Business Park Blvd, Suite 4000, Anchorage, Alaska, 99503.**

3.02 The Owner has retained **DOWL** ("Engineer") to act as Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 – CONTRACT TIMES

4.01 *Time of the Essence*

A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 *Contract Times: Dates*

A. The Work will be substantially completed on or before **November 30, 2024**, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before **December 31, 2024**.

4.03 Liquidated Damages

A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize the delays, expense, and difficulties

AGREEMENT
BETWEEN OWNER AND CONTRACTOR
FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):

1. Substantial Completion: Contractor shall pay Owner \$ 250 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified in Paragraph 4.02.A above for Substantial Completion until the Work is substantially complete.
2. Completion of Remaining Work: After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner \$ 500 for each day that expires after such time until the Work is completed and ready for final payment.
3. Liquidated damages for failing to timely attain Substantial Completion and final completion are not additive and will not be imposed concurrently.
4. ~~Milestones: Contractor shall pay Owner \$ _____ for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for achievement of Milestone 1, until Milestone 1 is achieved.~~

~~B. Bonus: Contractor and Owner further recognize the Owner will realize financial and other benefits if the Work is completed prior to the time specified for Substantial Completion. Accordingly, Owner and Contractor agree that as a bonus for early completion, Owner shall pay Contractor \$ _____ for each day prior to the time specified in Paragraph 4.02 for Substantial Completion (as duly adjusted pursuant to the Contract) that the Work is substantially complete. The maximum value of the bonus shall be limited to \$ _____.~~

1.

ARTICLE 5 – CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents the amounts that follow, subject to adjustment under the Contract:

- A. For all Work, at the prices stated in Contractor's Bid, attached hereto as an exhibit.

ARTICLE 6 – PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments

- A. Contractor shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02 Progress Payments; Retainage

- A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the **1st (first)** day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.

AGREEMENT
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1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract
 - a. **Ninety (90)** percent of Work completed (with the balance being retainage), and
 - b. **Ninety (90)** percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).
 - B. Upon Substantial Completion of the entire Work to be provided under the Contract Documents, Owner shall pay an amount sufficient to increase total payments to Contractor to **Ninety-eight (98)** percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less **Two Hundred (200)** percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.
- 6.03 *Final Payment*
- A. Upon final completion and acceptance of the Work in accordance with Paragraph 15.06 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 15.06.

ARTICLE 7 – INTEREST

- 7.01 All amounts not paid when due shall bear interest at the rate of **Eight (8)** percent per annum.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

- 8.01 In order to induce Owner to enter into this Contract, Contractor makes the following representations:
- A. Contractor has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.
 - B. Contractor has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 - C. Contractor is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
 - D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.
 - E. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods,

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FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

techniques, sequences, and procedures of construction to be employed by Contractor; and (3) Contractor's safety precautions and programs.

- F. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
- G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
- H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
- I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
- J. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 *Contents*

- A. The Contract Documents consist of the following:
 - 1. This Agreement (EJCDC C-520 pages 1 to 7, inclusive).
 - 2. Performance bond (EJCDC C-610 pages 1 to 3, inclusive).
 - 3. Payment bond (EJCDC C-615 pages 1 to 3, inclusive).
 - 4. General Conditions (EJCDC C-700 pages 1 to 69, inclusive).
 - 5. Supplementary Conditions (EJCDC C-800 pages 1 to 4, inclusive).
 - 6. Specifications as listed in the table of contents of the Project Manual.
 - 7. Drawings (not attached but incorporated by reference) consisting of 35 sheets with each sheet bearing the following general title: Chemical Storage Building Phase 2
 - 8. Addenda (numbers ___ to ___, inclusive).
 - 9. Exhibits to this Agreement (enumerated as follows):
 - a. Contractor's Bid (pages ___ to ___, inclusive).
 - 10. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
 - a. Notice to Proceed.
 - b. Work Change Directives.
 - c. Change Orders.
 - d. Field Orders.

- B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 9.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in the General Conditions.

ARTICLE 10 – MISCELLANEOUS

10.01 *Terms*

- A. Terms used in this Agreement will have the meanings stated in the General Conditions and the Supplementary Conditions.

10.02 *Assignment of Contract*

- A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 *Successors and Assigns*

- A. Owner and Contractor each binds itself, its successors, assigns, and legal representatives to the other party hereto, its successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

10.04 *Severability*

- A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

10.05 *Contractor's Certifications*

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.05:
 - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process or in the Contract execution;
 - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 - 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and

AGREEMENT
BETWEEN OWNER AND CONTRACTOR
FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

10.06 *Other Provisions*

- A. Owner stipulates that if the General Conditions that are made a part of this Contract are based on EJCDC® C-700, Standard General Conditions for the Construction Contract, published by the Engineers Joint Contract Documents Committee®, and if Owner is the party that has furnished said General Conditions, then Owner has plainly shown all modifications to the standard wording of such published document to the Contractor, through a process such as highlighting or "track changes" (redline/strikeout), or in the Supplementary Conditions.

AGREEMENT
BETWEEN OWNER AND CONTRACTOR
FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement.

This Agreement will be effective on _____ (which is the Effective Date of the Contract).

OWNER:

City of Bethel _____

By: _____

Title: _____

Attest: _____

Title: _____

Address for giving notices:

CONTRACTOR:

By: _____

Title: _____

(If Contractor is a corporation, a partnership, or a joint venture, attaches evidence of authority to sign.)

Attest: _____

Title: _____

Address for giving notices:

License or
Registration
No.:

(where applicable)

**SECTION 00 61 13.13
PERFORMANCE BOND**

CONTRACTOR *(name and address):*

SURETY *(name and address of principal place of business):*

OWNER *(name and address):*

City of Bethel
P.O. Box 1388
Bethel, Alaska 99559

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location):* Chemical Storage Building Phase 2 – Building Construction, Bethel, Alaska

BOND

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract):*

Amount:

Modifications to this Bond Form: ☐ None ☐ See Paragraph 16

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

(seal)

Contractor's Name and Corporate Seal

By: _____
Signature

Print Name

Title

Attest: _____
Signature

Title

SURETY

(seal)

Surety's Name and Corporate Seal

By: _____
Signature *(attach power of attorney)*

Print Name

Title

Attest: _____
Signature

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.
2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after:
 - 3.1 The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;
 - 3.2 The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
 - 3.3 The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.
4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.
5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:
 - 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;
 - 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;
 - 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or
 - 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:
 - 5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
 - 5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.
6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.
7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:
 - 7.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
 - 7.2 additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and
 - 7.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.
9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.
10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
11. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit shall be applicable.
12. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.
13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
14. Definitions
 - 14.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.
 - 14.2 Construction Contract: The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.
 - 14.3 Contractor Default: Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.
 - 14.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
 - 14.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.
15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.
16. Modifications to this Bond are as follows:

SECTION 00 61 13.16
PAYMENT BOND

CONTRACTOR *(name and address):*

SURETY *(name and address of principal place of business):*

OWNER *(name and address):*

City of Bethel
P.O. Box 1388
Bethel, Alaska 99559

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location):* Chemical Storage Building Phase 2 – Building Construction, Bethel, Alaska

BOND

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract):*

Amount:

Modifications to this Bond Form: ☐ None ☐ See Paragraph 18

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal

Surety's Name and Corporate Seal

By: _____
Signature

By: _____
Signature *(attach power of attorney)*

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
5. The Surety's obligations to a Claimant under this Bond shall arise after the following:
 - 5.1 Claimants who do not have a direct contract with the Contractor,
 - 5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
 - 5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).
 - 5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
 - 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
 - 7.2 Pay or arrange for payment of any undisputed amounts.
 - 7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.
8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
9. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.
11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.
16. **Definitions**
 - 16.1 **Claim:** A written statement by the Claimant including at a minimum:
 1. The name of the Claimant;
 2. The name of the person for whom the labor was done, or materials or equipment furnished;
 3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
 4. A brief description of the labor, materials, or equipment furnished;
 5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
 6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
 7. The total amount of previous payments received by the Claimant; and
 8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.
 - 16.2 **Claimant:** An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.
 - 16.3 **Construction Contract:** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.
 - 16.4 **Owner Default:** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
 - 16.5 **Contract Documents:** All the documents that comprise the agreement between the Owner and Contractor.
17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.
18. Modifications to this Bond are as follows:

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
 3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 5. *Bidder*—An individual or entity that submits a Bid to Owner.
 6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
 7. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
 8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.
 9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
 10. *Claim*—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract; or (b) a demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural

requirements set forth herein, contesting Engineer's decision regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer has declined to address. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. ("CERCLA"); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5501 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §6901 et seq. ("RCRA"); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
12. *Contract*—The entire and integrated written contract between the Owner and Contractor concerning the Work.
13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents. .
15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
17. *Cost of the Work*—See Paragraph 13.01 for definition.
18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
20. *Engineer*—The individual or entity named as such in the Agreement.
21. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
22. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.
23. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

24. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
25. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date or by a time prior to Substantial Completion of all the Work.
26. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.
27. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
28. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
29. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
30. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.
31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.
32. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or "RPR" includes any assistants or field staff of Resident Project Representative.
33. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals and the performance of related construction activities.
35. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.
36. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.

37. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands furnished by Owner which are designated for the use of Contractor.
38. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
39. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
40. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.
42. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
43. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.
45. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
46. *Unit Price Work*—Work to be paid for on the basis of unit prices.
47. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such

construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

48. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work. **A Work Change Directive cannot change Contract Price or Contract Times without a subsequent Change Order.**

1.02 *Terminology*

- A. The words and terms discussed in the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:*
1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.
- C. *Day:*
1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:*
1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or 15.04).
- E. *Furnish, Install, Perform, Provide:*
1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.
- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

- A. *Bonds*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.
- C. *Evidence of Owner’s Insurance*: After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), the certificates and other evidence of insurance required to be provided by Owner under Article 6.
- D. **Contractor shall use forms EJCDC No. C-610 and C-615 (2013 ed.) for the Labor and Material Payment Bond and Performance Bond. Each bond shall be in the amount of 100 percent of the contract amount. City of Bethel shall be named as co-obligee or a separate Warranty Bond shall be provided to them upon completion of the work.**

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor **four (4)** printed copies of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

- A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Contract (or as otherwise specifically required by the Contract Documents), Contractor shall submit to Engineer for timely review:
1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 2. a preliminary Schedule of Submittals; and
 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.
 4. **Contractor shall submit a preliminary list of construction equipment with hourly rates, owned or rented by the Contractor and all Subcontractors that will be used in the performance of the Work. The equipment list will include information necessary to confirm the hourly rates per Paragraph 13.01.B.5.c of these General Conditions including: make, model, and year of manufacture as well as horse power, capacity or weight and accessories.**

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.
- C. **A preconstruction conference will be held in Bethel and will be coordinated with the Contractor after bid opening.**

2.05 *Initial Acceptance of Schedules*

- ~~A. Prior to the first application for payment all schedules and documents identified in paragraph 2.03 shall be finalized and acceptable to Owner and Engineer. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer and Owner as provided below. Acceptance of these schedules and documents by either Engineer or Owner will neither impose on Engineer or Owner responsibility for sequencing, scheduling or progress of the Work and will not interfere with or relieve Contractor from Contractor's full responsibility therefore. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make corrections and~~

~~adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.~~

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.
4. **Contractor's Schedule of Equipment will be acceptable to Engineer as to form and substance if it provides the necessary information to reference the equipment and establish the hourly rates in accordance with paragraph 13.01.B.5.c.**

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.
- B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.

- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

3.02 *Reference Standards*

A. Standards Specifications, Codes, Laws and Regulations

1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
2. No provision of any such standard specification, manual, reference standard, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies:*

1. *Contractor's Verification of Figures and Field Measurements:* Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.
2. *Contractor's Review of Contract Documents:* If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
 - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work thereunder.
- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly give written notice to Owner and Contractor that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

- A. Contractor and its Subcontractors and Suppliers shall not:
 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or
 2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.

- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to such date.

4.03 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.
 - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 11.
- B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times and Contract Price. Contractor's entitlement to an adjustment

of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
 - 1. severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 - 2. abnormal weather conditions;
 - 3. acts or failures to act of utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and
 - 4. acts of war or terrorism.
- D. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5.
- E. Paragraph 8.03 governs delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.
- F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor.
- G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.

- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment. **If it is necessary or desirable that the Contractor use land outside of the Owner's site, easement or right-of-way, the Contractor shall obtain consent from the property owner and tenant of the land. The Contractor shall not enter for material delivery, storage or occupy for any other purpose with men, tools, equipment, construction material, or with materials excavated from the site, any private property outside the designated limits of the construction site, easement boundaries, or right-of-way without written permission from the property owner and tenant.**

5.02 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas:*

- 1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
 - 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.12, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or at law; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste

materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

- C. *Cleaning*: Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. *Loading of Structures*: Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

- A. *Reports and Drawings*: The Supplementary Conditions identify:
 - 1. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;
 - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); and
 - 3. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:
 - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
 - 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 - 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.
 - 4. **Contractor is required to visit the site and become familiar with and satisfied as to the general, local, and site conditions that may affect cost, progress, performance, and furnishing of the Work. This is to involve an alert, heads-up, eyes open, reasonable examination of the area and the conditions under which the Work is to be performed (See 5.04 D.2b)**

5.04 *Differing Subsurface or Physical Conditions*

- A. *Notice by Contractor:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site either:
1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or
 2. is of such a nature as to require a change in the Drawings or Specifications; or
 3. differs materially from that shown or indicated in the Contract Documents; or
 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition **within 15 calendar days of discovery**. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

No Change Proposal or Claim for an adjustment in Contract Price or Contract Time (including Milestones) will be valid for differing subsurface or physical conditions if notice provisions of the Paragraph 5.04 are not followed.

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine the necessity of Owner's obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Possible Price and Times Adjustments:*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. such condition must fall within any one or more of the categories described in Paragraph 5.04.A;

- b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,
 - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
 - a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise; or
 - b. the existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph 5.04.A.
3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
 1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and
 2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;
 - c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and

- d. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
 - e. **Before beginning any excavation, the Contractor shall contact the appropriate "one call" underground utility locate service and/or notify all owners of underground facilities (as applicable) and coordinate the Work with the owners of such underground facilities. The information shown or indicated in the Contract Documents with respect to existing underground facilities is based on information and data obtained from the owners of the facilities without field exploration and as such Owner and Engineer are not responsible for the accuracy or completeness of such information or data.**
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site **is unusual and payment per the applicable unit price item Bid for encountering existing Underground Facilities isn't applicable** was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.
- C. *Engineer's Review:* Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and recommendations. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question, addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Possible Price and Times Adjustments:*
- 1. Contractor shall **be paid at the unit price Bid for encountering Underground Facilities and will not** be entitled to **additional** equitable adjustment in the Contract Price or Contract Times, or both, **unless the Engineer's review determines that the existing facility is unusual and shouldn't be covered by the unit price and the** ~~to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, or any related~~ ~~causes~~ causing an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

- a. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and
 - d. Contractor gave the notice required in Paragraph 5.05.B.
2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 Hazardous Environmental Conditions at Site

A. Reports and Drawings: The Supplementary Conditions identify:

1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
2. Technical Data contained in such reports and drawings.

B. Reliance by Contractor on Technical Data Authorized: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.

C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.

- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.
- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off.
- H. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.
- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for

whom Contractor is responsible. Nothing in this Paragraph 5.06.H shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6 – BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of all of Contractor's obligations under the Contract. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.
- B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.
- C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.
- D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such

notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.

- E. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.
- F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this Article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- E. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- F. If either party does not purchase or maintain all of the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.

- G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.
- H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price shall be adjusted accordingly.
- I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.
- J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 Contractor's Insurance

- A. *Workers' Compensation:* Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.
 - 2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).
 - 3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).
 - 4. Foreign voluntary worker compensation (if applicable).
- B. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:
 - 1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.
 - 2. claims for damages insured by reasonably available personal injury liability coverage.
 - 3. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- C. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:
 - 1. Products and completed operations coverage:
 - a. Such insurance shall be maintained for three years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.

2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Broad form property damage coverage.
 4. Severability of interest.
 5. Underground, explosion, and collapse coverage.
 6. Personal injury coverage.
 7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.
 8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.
- D. *Automobile liability:* Contractor shall purchase and maintain automobile liability insurance against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.
- E. *Umbrella or excess liability:* Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.
- F. *Contractor's pollution liability insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.
- G. *Additional insureds:* The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.
- H. *Contractor's professional liability insurance:* If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself,

then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.

- I. *General provisions:* The policies of insurance required by this Paragraph 6.03 shall:
 - 1. include at least the specific coverages provided in this Article.
 - 2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.
 - 3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.
 - 4. remain in effect at least until final payment (and longer if expressly required in this Article) and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract Documents.
 - 5. be appropriate for the Work being performed and provide protection from claims that may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable.
- J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

6.04 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.
- B. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

6.05 *Property Insurance*

- A. *Builder's Risk:* Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the full insurable replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
 - 1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."

2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.
3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.
4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).
5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).
6. extend to cover damage or loss to insured property while in transit.
7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
8. allow for the waiver of the insurer's subrogation rights, as set forth below.
9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.
10. not include a co-insurance clause.
11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.
12. include performance/hot testing and start-up.
13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.

- B. *Notice of Cancellation or Change:* All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured.
- C. *Deductibles:* The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.
- D. *Partial Occupancy or Use by Owner:* If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
- E. *Additional Insurance:* If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.05, it may do so at Contractor's expense.
- F. *Insurance of Other Property:* If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

6.06 *Waiver of Rights*

- A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all Subcontractors, all individuals or entities identified in the Supplementary Conditions as insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.
- D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.
- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.05 shall distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, 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. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.

- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during daytime hours (7:00 AM to 7:00 PM), Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.04 *"Or Equals"*

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment, or items from other proposed suppliers under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer shall deem it an "or equal" item. For the purposes of this paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:

- a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) it has a proven record of performance and availability of responsive service; and
 - 4) it is not objectionable to Owner.
- b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. *Contractor's Expense:* Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal", which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.
- D. *Effect of Engineer's Determination:* Neither approval nor denial of an "or-equal" request shall result in any change in Contract Price. The Engineer's denial of an "or-equal" request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.
- E. *Treatment as a Substitution Request:* If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer considered the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 Substitutes

- A. Unless the specification or description of an item of material or equipment required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment under the circumstances described below. To the extent possible such requests shall be made before commencement of related construction at the Site.
 - 1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of material or equipment from anyone other than Contractor.
 - 2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

3. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - a. shall certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design,
 - 2) be similar in substance to that specified, and
 - 3) be suited to the same use as that specified.
 - b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times,
 - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from that specified, and
 - 2) available engineering, sales, maintenance, repair, and replacement services.
 - d. shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
- C. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract

Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

- E. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
- F. *Effect of Engineer's Determination:* If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. **The Contractor shall not award work valued at more than fifty percent (50%) of the Contract Price to Subcontractor(s), without prior written approval of the Owner.**
- B. ~~**Deleted.** Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract to do so.~~
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable, during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within five days.
- E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. ~~Owner also may require Contractor to retain specific replacements; provided, however, that~~ Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors, Suppliers, or other individuals or entities for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.
- F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.

- G. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.
- H. On a monthly basis Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions.
- J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.
- K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.
- L. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.
- N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.
- O. Nothing in the Contract Documents:
 - 1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier, or other individual or entity; nor
 - 2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

7.07 Patent Fees and Royalties

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.08 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work

7.09 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

7.10 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents

is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

- C. Owner or Contractor may give notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.11 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer. **The Engineer will transfer the Contractor's record information to the original drawings, and submit prints to the Contractor for review. Contractor shall provide writing confirmation that the record drawings are complete and accurate before final payment is approved by the Engineer.**

7.12 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;
 - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.

- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
- G. Contractor's duties and responsibilities for safety and protection shall resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.
- H. **It is expressly understood by the parties to this Agreement that the Contractor is solely responsible for initiation, maintenance, and supervision of safety precautions and programs in connection with the Work. The right of the Owner and Engineer to observe or otherwise review the Work and operations shall not relieve the Contractor from any of his covenants and obligations hereunder.**
- I. **The Contractor shall be responsible for and shall take necessary precautions and provide all material and equipment to protect, shore, brace and maintain all underground pipes, conduits, drains, sewers, water mains, gas mains, cables, and other underground construction uncovered in the proximity or otherwise affected by the Work. All pavement surfacing, driveways, curbs, walks, buildings, grass areas, trees, utility poles or guy wires damaged by the Contractor in performance of the Work shall be repaired and/or replaced to the satisfaction of the Owner, Engineer and effected property owner at the Contractor's expense. The Contractor shall also be responsible for all damage to streets, roads, highways, shoulders, ditches, embankments, culverts, bridges or other public or private property or facility, regardless of location or character, which may be caused by moving, hauling, or otherwise transporting equipment, materials, or men to and from the Work whether by Contractor or Subcontractors. The Contractor shall make satisfactory and acceptable arrangements with the owner of, or the agency or authority having jurisdiction over the damaged property or facility concerning its repair, replacement or payment of costs incurred in connection with said damage.**
- J. **The Contractor shall conduct its work so as to interfere as little as possible with public travel, whether vehicular or pedestrian. Whenever it is necessary to cross, obstruct or close roads, driveways, and walks, whether public or private, the Contractor shall obtain approval from the**

governing party and shall at its own expense provide and maintain suitable and safe bridges, detours and other temporary expedients for the accommodation of public and private drives before interfering with them. The provision for temporary expedients will not be required if the Contractor has obtained permission from the owner and tenant of the private property, or from the authority having jurisdiction over public property involved, to obstruct traffic at the designated point.

- K. **Safety provisions must be entirely adequate and meet with city, state or Federal regulations to protect the public on the sidewalks, streets and roads.**

7.13 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.15 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

7.16 *Shop Drawings, Samples, and Other Submittals*

- A. *Shop Drawing and Sample Submittal Requirements:*
1. Before submitting a Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that submittal, and that Contractor approves the submittal.
 3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.
- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.
1. *Shop Drawings:*
 - a. Contractor shall submit the number of copies required in the Specifications.
 - b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.D.
 2. *Samples:*
 - a. Contractor shall submit the number of Samples required in the Specifications.
 - b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 7.16.D.
 3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Other Submittals:* Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.
- D. *Engineer's Review:*
1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
 2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto.
 3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

4. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order.
5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 7.16.A and B.
6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, shall not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
7. Neither Engineer's receipt, review, acceptance or approval of a Shop Drawing, Sample, or other submittal shall result in such item becoming a Contract Document.
8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.D.4.

E. *Resubmittal Procedures:*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.
2. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

7.17 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.

- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
1. observations by Engineer;
 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 4. use or occupancy of the Work or any part thereof by Owner;
 5. any review and approval of a Shop Drawing or Sample submittal;
 6. the issuance of a notice of acceptability by Engineer;
 7. any inspection, test, or approval by others; or
 8. any correction of defective Work by Owner.
- D. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract shall govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 Indemnification

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
1. **Contractor specifically and expressly waives any immunity that may be granted it under workers' compensation acts, disability benefit acts, or other employee benefit acts in**

regard to 17.1.B above; provided Contractor's waiver of immunity by the provisions of this paragraph extends only to claims against Contractor by Indemnitees, and does not include, or extend to, any claims by Contractor's employees directly against Contractor.

- C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
 - 1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 - 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

7.19 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable Laws and Regulations.
- B. If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this paragraph, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 7.16.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

ARTICLE 8 – OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.

- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any utility work at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.
- D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

8.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:
 - 1. the identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
 - 2. an itemization of the specific matters to be covered by such authority and responsibility; and
 - 3. the extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

- A. If, in the course of performing other work at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment shall take into account information (if any) regarding such other work that was

provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract. When applicable, any such equitable adjustment in Contract Price shall be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due to Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this paragraph.
- C. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due to Contractor.
- D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9 – OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

9.02 *Replacement of Engineer*

- A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents shall be that of the former Engineer.

9.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

9.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

9.05 *Lands and Easements; Reports, Tests, and Drawings*

- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
- B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
- C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *Limitations on Owner's Responsibilities*

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

9.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
- B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10 – ENGINEER’S STATUS DURING CONSTRUCTION

10.01 *Owner’s Representative*

- A. Engineer will be Owner’s representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner’s representative during construction are set forth in the Contract.

10.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor’s executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer’s efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer’s visits and observations are subject to all the limitations on Engineer’s authority and responsibility set forth in Paragraph 10.08. Particularly, but without limitation, during or as a result of Engineer’s visits or observations of Contractor’s Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor’s means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Project Representative*

- A. A Project Representative will also represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 10.08. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer’s consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

10.04 *Rejecting Defective Work*

- A. Engineer has the authority to reject Work in accordance with Article 14.

10.05 *Shop Drawings, Change Orders and Payments*

- A. Engineer’s authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.
- B. Engineer’s authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, are set forth in Paragraph 7.19.
- C. Engineer’s authority as to Change Orders is set forth in Article 11.

- D. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.06 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

10.07 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.08 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 15.06.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs (if any) of which Engineer has been informed.

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

11.01 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
 - 1. *Change Orders:*
 - a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.
 - b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.
 - 2. *Work Change Directives:* A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.
 - 3. *Field Orders:* Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.02 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Such changes shall be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change

Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph shall obligate Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.03 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.

11.04 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:
 - 1. where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03); or
 - 2. where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.C.2); or
 - 3. where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.04.C).
- C. *Contractor's Fee:* When applicable, the Contractor's fee for overhead and profit shall be determined as follows:
 - 1. a mutually acceptable fixed fee; or
 - 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five percent;
 - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.01.C.2.a and 11.01.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually

performs the Work, a fee of five percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted work the maximum total fee to be paid by Owner shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;

- d. no fee shall be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
- e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
- f. 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 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.
- B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *Change Proposals*

- A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.
 - 1. *Procedures:* Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.
 - 2. *Engineer's Action:* Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time

thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

3. *Binding Decision:* Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- B. *Resolution of Certain Change Proposals:* If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

11.07 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
 1. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 2. changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 3. changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.02, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and
 4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.
- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety 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 Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

ARTICLE 12 – CLAIMS

12.01 *Claims*

- A. *Claims Process*: The following disputes between Owner and Contractor shall be submitted to the Claims process set forth in this Article:
1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and
 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters.
- B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.
- C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation*:
1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate shall stay the Claim submittal and response process.
 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.
 3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action shall be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take

action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.

- G. *Final and Binding Results:* If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim shall be incorporated in a Change Order to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work:* The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or
 2. To determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included:* Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.
 2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to

Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of 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 Contractor.
 - c. ~~Rentals of~~ **The cost for the use of** all construction equipment and machinery, and the parts thereof, **whether owned by the Contractor or** rented from Contractor or others **shall be calculated as follows and include the** ~~in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof~~ **for equipment involved only in the changed portion of the work covered under the Cost of the Work method. Transportation, loading and assembly costs will not be included for equipment already on the site which is being used for other portions of the Work. Hourly equipment and machinery rates shall be calculated from the Rental Rate Blue Book for Construction Equipment, and the equipment list submitted according to Paragraph 2.03 and 2.05 and as follows. All such costs shall be in accordance with the 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.**
 - 1) **For working equipment, the hourly rate shall be the monthly rental rate divided by 176 hours per month plus the hourly operating cost.**
 - 2) **For equipment on standby, the hourly rate shall be 50% of the monthly rental rate divided by 176 hours per month and the hourly operating cost shall not be applied.**
 - 3) **For specialized equipment rented for a short duration used for change order work or additional work not part of the scope of the Work bid, the equipment rental rate will be in accordance with the terms of a third party rental agreement or shall be negotiated prior to the work being performed.**

- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than 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, and royalty payments and fees for permits and licenses.
 - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 6.05), provided such losses and damages have resulted from causes other than 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. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.
 - g. The cost of utilities, fuel, and sanitary facilities at the Site.
 - h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
 - i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.
- C. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:
- 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
 - 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
 - 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.
 - 4. 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.
 - 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.
- D. *Contractor's Fee:* When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by

a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.

- E. *Documentation*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

13.02 Allowances

- A. 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 performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.
- B. *Cash Allowances*: Contractor agrees that:
1. the cash 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
 2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.
- C. *Contingency Allowance*: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

13.03 Unit Price Work

- A. 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 unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. 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. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of the following paragraph.

- E. **The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment under the following conditions** ~~Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:~~
1. **if the extended price of a particular item of Unit Price Work amounts to five percent (5%) or more of the Contract Price (based on estimated quantities at the time of Contract formation) and the variation in the quantity of that particular item of Unit Price Work actually furnished or performed by Contractor differs by more than twenty-five percent (25%) from the estimated quantity of such item indicated in the Agreement; and**
 2. there is no corresponding adjustment with respect to any other item of Work; and
 3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 14 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

14.02 *Tests, Inspections, and Approvals*

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;

2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
3. by manufacturers of equipment furnished under the Contract Documents;
4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests shall be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects:* Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement:* Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties:* When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages:* In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work shall be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

- A. Engineer has the authority to require special inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.
- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.
 - 1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.
 - 2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the

benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 Owner May Correct Defective Work

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15 – PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 Progress Payments

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments:*
 - 1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. 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, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the

materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner. **Payment for materials in storage shall be based on the actual cost of the materials and equipment to Contactor and shall not include any overhead or profit. Documentation warranting Owner has received the materials and equipment free and clear of all Liens will be waived for the material in storage included in the first progress payment. However, proof of payment and clear title must be submitted with Application No. 2 for all material included in Application No. 1. Without such documentation amounts paid per Application No. 1 for materials in storage will be deducted from Application No 2. Beginning with the second application, all payment for materials in storage will require documentation warranting that Owner is receiving the materials free and clear of all liens.**

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement. **Retainage may be used by Owner to offset costs for any of the losses enumerated in Paragraphs 15.01.C.6.a through 15.01.C.6.e inclusive, 15.01.E.1.a through 15.01.E.1.i inclusive or 16.02.E. In additions retainage may be used by the Owner to protect against loss from failure of the Contractor to complete necessary work and to offset any liquidated damages due Owner.**

No payments will be made that would deplete the retainage, place in escrow any funds that are required for retainage, or invest retainage for the benefit of the Contractor.

4. **Each Application for Payment shall be accompanied by Contractor's updated progress schedule, shop drawing schedule, procurement schedule, and other data specified herein. Owner reserves the right to required submission of certified payroll records by the Contractor.**

C. Review of Applications:

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work

- under Paragraph 13.03, and any other qualifications stated in the recommendation); and
- c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
 4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
 5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
 6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or
 - e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due:*

1. **The Application for Payment with Engineer's recommendations will be presented to the Owner and Agency (if applicable) for consideration. If both Owner and Agency find the Application for Payment acceptable, the recommended amount less any reduction under the provision of Paragraph 15.01.E will become due twenty (20) days after the Application for Payment is presented to the Owner, and the Owner will make payment to the Contractor.** ~~Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.~~

E. *Reductions in Payment by Owner:*

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. claims have been made against Owner on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;
 - b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
 - f. the Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. the Contract Price has been reduced by Change Orders;
 - i. an event that would constitute a default by Contractor and therefore justify a termination for cause has occurred;
 - j. liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - l. there are other items entitling Owner to a set off against the amount recommended.
2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written

notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed shall be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 15.01.C.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than seven days after the time of payment by Owner.

15.03 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer or Owner does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor. **Contractor shall immediately correct the deficiencies and re-notify the Engineer in writing that the Work is substantially complete.**
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which shall fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's

risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
 - 1. At any time Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through E for that part of the Work.
 - 2. At any time Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
 - 4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.05 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *Final Payment*

A. *Application for Payment:*

1. After Contractor has, in the opinion of Engineer **and Owner**, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.11), and other documents, Contractor may make application for final payment.
2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.
 - d. a list of all disputes that Contractor believes are unsettled; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work, **and**
 - f. **record documents.**
3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

B. *Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final

payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

- C. *Completion of Work*: The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.
- D. *Payment Becomes Due*: Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

- A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.
- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted or appealed under the provisions of Article 17.

15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed 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, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such other adjacent areas;
 - 2. correct such defective Work;
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).

- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
 - 1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule);
 - 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 - 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
 - 4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:
 - 1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and
 - 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which

Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.

- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.
- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and
 - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days

to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.

- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this Article:
1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and
 2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this Article, Owner or Contractor may:
1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or
 2. agree with the other party to submit the dispute to another dispute resolution process; or
 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18 – MISCELLANEOUS

18.01 *Giving Notice*

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or
 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

18.02 *Computation of Times*

- A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a

Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

- A. A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

18.07 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

18.08 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SECTION 00 80 00

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, EJCDC® C-700 (2013 Edition). All provisions that are not so amended or supplemented remain in full force and effect.

To the greatest extent possible the modifications to the Standard General Conditions of the Construction Contract (EJCDC 700) have been made electronically in the text of the General Conditions. The modifications are shown in the General Conditions as strikeout for deletions and bold/underline for additions. These Supplementary Conditions contain additional “project specific” changes, additions or modifications.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

SC-5.03 Subsurface and Physical Conditions

SC-5.03 Add the following new paragraphs immediately after Paragraph 5.03.B:

- C.** The following reports of explorations and tests of subsurface conditions at or adjacent to the Site are known to Owner:
 - 1.** **June 23, 2023 DOWL Letter**
Subject: Chemical Storage Building – Site 2 – Public Works Facility Location
Bethel Alaska
Geotechnical Investigation and Recommendations

SC-5.06 Add the following subparagraph 5.06.A.1 and 5.06.A.2:

- 1.** The following reports regarding Hazardous Environmental Conditions at the Site are known to Owner:
 - a.** **December 16, 2014 ADEC Letter**
Re: Decision Document: Bethel Public Works Yard
Corrective Action Complete Determination – Institutional Controls

ARTICLE 6 – BONDS AND INSURANCE

SC-6.03 Contractor's Liability Insurance

Add the following new paragraph immediately after Paragraph 6.03.J:

K. The limits of liability for the insurance required by Paragraph 6.03 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers' Compensation, and related coverages under Paragraphs 6.03.A.1 and A.2 of the General Conditions:

State:	<u>Statutory</u>
Federal, if applicable (e.g., Longshoreman's):	<u>Statutory</u>
Employer's Liability:	
Bodily injury, each accident	<u>\$1,000,000</u>
Bodily injury by disease, each employee	<u>\$1,000,000</u>
Bodily injury/disease aggregate	<u>\$1,000,000</u>

2. Contractor's Commercial General Liability under Paragraphs 6.03.B and 6.03.C of the General Conditions:

General Aggregate	<u>\$2,000,000</u>
Products - Completed Operations Aggregate	<u>\$1,000,000</u>
Personal and Advertising Injury	<u>\$1,000,000</u>
Each Occurrence (Bodily Injury and Property Damage)	<u>\$1,000,000</u>

3. Automobile Liability under Paragraph 6.03.D. of the General Conditions:

Combined Single Limit **\$1,000,000**

4. Excess or Umbrella Liability:

Per Occurrence	<u>\$4,000,000</u>
General Aggregate	<u>\$4,000,000</u>

5. Contractor's Pollution Liability:

Each Occurrence	<u>NA</u>
General Aggregate	<u>NA</u>

X If box is checked, Contractor is not required to provide Contractor's Pollution Liability insurance under this Contract

6. Additional Insureds: In addition to Owner and Engineer, include as additional insureds the following:

a.

7. Contractor's Professional Liability:

Each Claim

NA

Annual Aggregate

NA

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

SC-7.12 Safety and Protection

A. The Contractor is to prepare and maintain a project specific health and safety plan. Health and Safety plan will be subject to review and approval by Engineer and Owner.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

SC-17.02 Arbitration

- A. All matters subject to final resolution under this Article will be decided by arbitration in accordance with the Construction Industry Rules of the American Arbitration Association subject to the conditions and limitations of this paragraph. This agreement to arbitrate and any other agreement or consent to arbitrate entered into will be specifically enforceable under the prevailing law of any court having jurisdiction.
- B. The demand for arbitration will be filed in writing with the other party to the Contract. The demand for arbitration will be made within the specific time required in this Article, or if no specified time is applicable within a reasonable time after the matter in question has arisen, and in no event shall any such demand be made after the date when institution of legal or equitable proceedings based on such matter in question would be barred by the applicable statute of limitations. The demand for arbitration should include specific reference to Paragraph SC-17.02.D below.
- C. No arbitration arising out of or relating to the Contract shall include by consolidation, joinder, or in any other manner any other individual or entity (including Engineer, and Engineer's consultants and the officers, directors, partners, agents, employees or consultants of any of them) who is not a party to this Contract unless:
 1. the inclusion of such other individual or entity is necessary if complete relief is to be afforded among those who are already parties to the arbitration; and

2. such other individual or entity is substantially involved in a question of law or fact which is common to those who are already parties to the arbitration and which will arise in such proceedings.
- D. The award rendered by the arbitrator(s) shall be consistent with the agreement of the parties, in writing, and include a concise breakdown of the award, and a written explanation of the award specifically citing the Contract provisions deemed applicable and relied on in making the award.
- E. The award will be final. Judgment may be entered upon it in any court having jurisdiction thereof, and it will not be subject to modification or appeal, subject to provisions of the Laws and Regulations relating to vacating or modifying an arbitral award.
- F. The fees and expenses of the arbitrators and any arbitration service shall be shared equally by Owner and Contractor.

SECTION 01 00 00 GENERAL REQUIREMENTS

PART 1 - SCOPE OF WORK

1.01 General

The Project consists of the construction of a steel frame warehouse with a concrete slab foundation as described in the project drawings.

PART 2 - PRE-CONSTRUCTION REQUIREMENTS

2.01 NONE

PART 3 - EXTRA OR DISPUTED WORK REPORTS

- 3.01 If payment for work performed is to be based on time and materials, or if a claim is contemplated in which time and material reports would assist in settling the claim, the Contractor shall maintain adequate records on the Daily Report forms available from the Engineer. The reported work shall have the Engineer's signature to indicate his concurrence prior to being submitted to the Engineer or Contract Administrator within 48 hours of the time the work was performed. Concurrence by the Engineer does not indicate agreement to or authorization of "extra work" or "extra payment" but rather indicates agreement that the work effort recorded during that time period was in fact done.

PART 4 - MATERIAL TESTING AND INSPECTION

4.01 Contractor's Obligation

- A. The Contractor shall obtain and pay for all testing that may be necessary to qualify Contractor-furnished materials for use in the work. This shall include material quality tests, mix designs, equipment and plant calibration, and other similar tests required to qualify Contractor-furnished materials for compliance with the specifications. The Contractor shall submit test results to the Engineer sufficiently in advance of the work so that approval to proceed is received by the Contractor prior to using that material in the work.
- B. Samples of material required for testing shall be furnished by the Contractor.
- C. The Contractor is responsible for coordinating with the Engineer and requesting all testing, including field testing paid for by the Owner.
- D. The Contractor shall pay for all failing field tests performed to monitor construction control of the materials used in the work.
- E. Payment for failing field tests will be deducted from any amounts due or to become due to the Contractor.

4.02 Owner's Obligation

- A. The Owner will be paying for the Engineer to be onsite part-time during the construction.

PART 5 - WEATHER LIMITATIONS

- 5.01 The Contractor shall protect each increment of completed work against detrimental effects due to weather, by approved methods. Any increment of completed work that is damaged by freezing or rain, shall be reconditioned, reshaped, re-compacted, or replaced by the Contractor in conformance with the requirements of this specification without additional cost to the Owner.

PART 6 - NOTICE TO BE GIVEN

- 6.01 Contractor shall notify the Engineer at least 72 hours prior to the following:
- A. On-site testing, and
 - B. Temporary blockage or rerouting of traffic on site.

PART 7 - LABOR STANDARDS, REPORTING, AND PREVAILING WAGE RATES DETERMINATIONS

- 7.01 The prevailing wage rates of the State of Alaska apply to this contract as do any requirements of the State of Alaska associated with the use of these State prevailing wages.

PART 8 - EXECUTION OF WORK

- 8.01 Survey Control
- Benchmarks, monuments, and baselines shown on the Drawings, shall be used for horizontal and vertical control by the Contractor. Caution shall be used when working near these and other survey monuments so as not to disturb them.
- 8.02 Disturbing Existing Monuments and Property Corners
- Should the Contractor's normal prosecution of work require that he disturb any property corners or survey monuments, he shall re-establish them after completion of the project and at no additional cost to the Owner. All referencing and re-establishment of property corners and survey monuments shall be performed by a Land Surveyor registered in the State of Alaska.
- 8.03 Construction Survey
- All construction survey stakes will be placed by the Contractor, based on the reference points indicated in the Drawings.
- 8.04 Traffic Control
- Contractor shall not block or inhibit movement of City of Bethel vehicles entering or leaving the Public Works facility. Emergency operations could require access to the facility 24 hours per day.

PART 9 - AS-BUILTS**9.01 General**

The Contractor shall provide the Owner as-built information on all construction. This information will include copies of the Contractor's field survey notes and a set of the Drawings red-lined with as-built information. Items to be as-built by the Contractor, include, but not are limited to, the water main alignments, culverts length and location, service line placement, service boxes, etc.

A. Control

Basis for horizontal control for as-built information shall be the system of stationing shown on the Drawings. All elevations shall be based on the datum used for design.

B. Survey Notes

All field survey notes shall include date, name of surveyor or foreman, and adequate description of TBM's when used. Sketches shall have north arrow and show relationship or ties to stationing control. All notes shall be reduced to show actual elevation at design datum.

END OF GENERAL REQUIREMENTS

SECTION 01 00 01

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

PART 1 - GENERAL

1.01 Scope

The method of measurement and basis of payment is described in this section.

1.02 General

- A. The total bid price for each item of the Contract shall cover all work shown on the Construction Drawings and required by the Specifications and other Contract Documents. All costs in connection with the Work, including furnishing all materials, equipment, supplies and appurtenances; providing all construction, equipment, and tools, performing all necessary labor and supervision to fully complete the Work and associated start-up and Commissioning, shall be included in the unit and lump sum bid prices. No item required by the Contract Documents for the proper and successful completion of the Work will be paid for outside of or in addition to the prices submitted in the bid. All work not specifically set forth as a pay item in the Bid Form included but not limited to reclamation, sodding, topsoil, seed, reinstalling existing signs and fences, replacing construction caused damaged signs and driveways, shall be considered a subsidiary obligation of the Contractor and all costs in connection therewith shall be included in the bid prices. Bid prices will also apply to additional similar work that is not shown on the plans that the Engineer may require to be installed during the project.
- B. All work completed under the Contract will be measured by the Engineer according to the United States Standard Measure. A station when used as a definition or term of measurement shall be 100 linear feet measured horizontally, unless otherwise specified.
- C. The method of measurement and computations to be used in determination of quantities of material furnished and of work performed under the Contract will be those methods generally recognized as conforming to standard engineering practice.
- D. Unless otherwise specified, longitudinal measurements for area computations will be made horizontally, and no deductions will be made for individual items having an area of nine square feet or less. Unless otherwise specified, transverse measurements for area computations will be the neat dimensions shown on the Drawings or ordered in writing by the Engineer.
- E. All items which are measured by the linear foot, such as pipe culverts, sewers or water lines, will be measured parallel to the base or foundations upon which structures are placed, unless otherwise shown on the Drawings.

1.03 ESTIMATED QUANTITIES

- A. The basis of payment for work and materials will be by lump sum as indicated. The Contractor shall supply a schedule of values for each lump sum item to be reviewed and approved by the Engineer.
- B. The Contractor agrees to make no claim for damages, anticipated profits, or otherwise on account of any difference between the amounts of work actually performed and materials actually furnished and the estimated amounts herein.

- C. If the Contractor desires to receive payment for materials in storage for any bid item, the Contractor shall provide a breakout of all materials and their actual costs for that bid item. The Contractor shall furnish the Engineer copies of the supplier's invoices relating to the breakout to verify all materials being requested for payment under that bid item. The Contractor shall furnish copies of the required invoices no later than 5 business days before the cut-off-date of each progress payment. Invoices received later than 5 business days before the cutoff date will not be included in that progress payment. Materials in storage will only be paid for major bid items and will not be paid for associated items such as nuts, bolts, glue, gaskets, tools, etc. Materials in storage are Contractor responsibility and Contractor must provide insurance to cover any loss, theft, damage, etc. Quantities to be utilized on the monthly pay request will be based on signed daily quantities.
- D. The following applies to materials in storage; materials in storage will only be allowed on the first three pay requests received from the Contractor unless otherwise agreed to by the Engineer. Materials in storage must be tied to an actual bid item, and quantities in storage must be removed from the storage quantity as work progresses. All materials in storage will be removed from the pay estimate no later than the sixth pay estimate, for each construction season. Any materials ordered and stored over the winter shall be secured and properly covered in accordance with the material manufactures recommendations and per the Engineer's directions.
- E. Contractor shall develop a form on which to record the percent complete for all lump sum bid items and submit the form at the preconstruction meeting, to the Engineer for approval. At the end of each pay period the Engineer and Contractor must agree on bid schedule values and the percent completion actually installed. A copy signed by the Contractor must be distributed to the Resident Project Representative on a monthly basis 5 days before the monthly pay period ends. Payment for lump sum items shall be made in accordance with the agreed upon percent complete each progress payment.

1.04 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

A. BID SCHEDULE

101 – Mobilization and Demobilization (Lump Sum)

Payment will be made on a lump sum basis for all Contractor Mobilization and Demobilization efforts. Disposal of unsalvageable materials at local landfill shall be incidental to Mobilization and Demobilization. Bonding and Insurance requirements shall be incidental to this Pay Item.

102 – Construction Survey and Record Drawings (Lump Sum)

Payment will be made on a lump sum basis for all work associated with conducting a construction survey, maintaining on-site construction record drawings, and submitting final record drawings. Preparation of all detailed record drawings in accordance with the specifications will also be paid under this item. Forty percent (40%) of this line item will be withheld until the Engineer approves record drawings.

103 – Installation of Chemical Storage Building (Lump Sum)

Payment will be made on a lump sum basis for all Work required to complete the Chemical Storage Building shown on the Drawings and specified herein, including the site development and utilities. This Pay Item shall include all Work not specified in other pay items and all Work necessary to provide a final finished project capable of the performance specified for all

components and systems of the project.

104 – Commission Mechanical Systems and Provide O&M Manuals (Lump Sum)

Payment will be made on a lump sum basis for Contractor to provide the equipment, personnel, and logistical support to perform all system Startup, Testing, and Commissioning Work specified including preparation and submittal of Facility Operation and Maintenance manuals, and City training.

END OF METHOD OF MEASUREMENT AND BASIS OF PAYMENT

SECTION 03 30 00 CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

1.02 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.03 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete Subcontractor.
 - e. Special concrete finish Subcontractor.
2. Review the following:
 - a. Special inspection and testing and inspecting agency procedures for field quality control.
 - b. Construction joints, control joints, isolation joints, and joint-filler strips.
 - c. Semirigid joint fillers.
 - d. Vapor-retarder installation.
 - e. Anchor rod and anchorage device installation tolerances.
 - f. Cold and hot weather concreting procedures.
 - g. Concrete finishes and finishing.
 - h. Curing procedures.
 - i. Forms and form-removal limitations.
 - j. Shoring and reshoring procedures.
 - k. Methods for achieving specified floor and slab flatness and levelness.
 - l. Floor and slab flatness and levelness measurements.
 - m. Concrete repair procedures.

- n. Concrete protection.
- o. Initial curing and field curing of field test cylinders (ASTM C31/C31M.)
- p. Protection of field cured field test cylinders.

1.04 ACTION SUBMITTALS

A. Product Data: For each of the following.

- 1. Portland cement.
- 2. Aggregates.
- 3. Admixtures:
 - a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
- 4. Vapor retarders.
- 5. Floor and slab treatments.
- 6. Liquid floor treatments.
- 7. Curing materials.
 - a. Include documentation from color pigment manufacturer, indicating that proposed methods of curing are recommended by color pigment manufacturer.
- 8. Joint fillers.
- 9. Repair materials.

B. Design Mixtures: For each concrete mixture, include the following:

- 1. Mixture identification.
- 2. Minimum 28-day compressive strength.
- 3. Durability exposure class.
- 4. Maximum w/cm.
- 5. Slump limit.
- 6. Air content.
- 7. Nominal maximum aggregate size.
- 8. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
- 9. Include manufacturer's certification that permeability-reducing admixture is compatible with mix design.
- 10. Include certification that dosage rate for permeability-reducing admixture matches dosage rate used in performance compliance test.
- 11. Intended placement method.
- 12. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings:

1. Steel Reinforcing: Submit shop drawings showing size, location, and detailing of all required steel reinforcing.
2. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - a. Location of construction joints is subject to approval of the Architect.

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Installer: Include copies of applicable ACI certificates.
2. Ready-mixed concrete manufacturer.
3. Testing agency: Include copies of applicable ACI certificates.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Curing compounds.
4. Floor and slab treatments.
5. Bonding agents.
6. Adhesives.
7. Vapor retarders.
8. Semirigid joint filler.
9. Joint-filler strips.
10. Repair materials.

C. Material Test Reports: For the following, from a qualified testing agency:

1. Portland cement.
2. Aggregates.
3. Admixtures:
 - a. Permeability-Reducing Admixture: Include independent test reports, indicating compliance with specified requirements, including dosage rate used in test.

D. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances.

E. Research Reports:

1. For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.
2. For sheet vapor retarder/termite barrier, showing compliance with ICC AC380.

F. Preconstruction Test Reports: For each mix design.

G. Field quality-control reports.

H. Minutes of preinstallation conference.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs Project personnel qualified as an ACI-certified Flatwork Technician and Finisher and a supervisor who is a certified ACI Flatwork Concrete Finisher/Technician or an ACI Concrete Flatwork Technician.
 - 1. Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.
- B. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.
 - 1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.
 - 1. Personnel performing laboratory tests to be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor to be an ACI-certified Concrete Laboratory Testing Technician, Grade II.
- D. Field Quality-Control Testing Agency Qualifications: An independent agency, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.
 - 1. Personnel conducting field tests to be qualified as an ACI Concrete Field Testing Technician, Grade 1, in accordance with ACI CPP 610.1 or an equivalent certification program.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94/C94M and ACI 301.

1.08 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1 and as follows.
 - 1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 2. 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.
 - 3. Do not use frozen materials or materials containing ice or snow.
 - 4. Do not place concrete in contact with surfaces less than 35 deg F, other than reinforcing steel.
 - 5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:
 - 1. Maintain concrete temperature at time of discharge to not exceed 95 deg F.
 - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

1.09 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to furnish replacement sheet vapor retarder/termite barrier material and accessories for sheet vapor retarder/ termite barrier and accessories that do not comply with requirements or that fail to resist penetration by termites within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS**2.01 CONCRETE, GENERAL**

- A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

2.02 CONCRETE MATERIALS

- A. Source Limitations:

1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
3. Obtain aggregate from single source.
4. Obtain each type of admixture from single source from single manufacturer.

- B. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, Type I/II, gray.

- C. Normal-Weight Aggregates: ASTM C33/C33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.

1. Alkali-Silica Reaction: Comply with one of the following:

- a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
- b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
- c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. for moderately reactive aggregate or 3 lb./cu. yd. for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301.

2. Maximum Coarse-Aggregate Size: 1 inch nominal.

3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

- D. Air-Entraining Admixture: ASTM C260/C260M.

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

1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
 2. Retarding Admixture: ASTM C494/C494M, Type B.
 3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
 5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
 7. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C494/C494M, Type C.
 8. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.
 9. Permeability-Reducing Admixture: ASTM C494/C494M, Type S, hydrophilic, permeability-reducing crystalline admixture, capable of reducing water absorption of concrete exposed to hydrostatic pressure (PRAH).
 - a. Permeability: No leakage when tested in accordance with U.S. Army Corps of Engineers CRD C48 at a hydraulic pressure of 200 psi for 14 days.
- F. Water and Water Used to Make Ice: ASTM C94/C94M, potable or complying with ASTM C1602/C1602M, including all limits listed in Table 2 and the requirements of paragraph 5.4

2.03 VAPOR RETARDERS

- A. Sheet Vapor Retarder, Class C: ASTM E1745, Class C; not less than 10 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive joint tape.

2.04 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

2.05 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- B. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.
1. Color:
 - a. Ambient Temperature Below 50 deg F: Black.
 - b. Ambient Temperature between 50 deg F and 85 deg F: Any color.
 - c. Ambient Temperature Above 85 deg F: White.
- C. Curing Paper: 8-foot-wide paper, consisting of two layers of fibred kraft paper laminated with double coating of asphalt.

D. Water: Potable or complying with ASTM C1602/C1602M.

2.06 RELATED MATERIALS

- A. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, in accordance with ASTM D2240.
- B. Bonding Agent: ASTM C1059/C1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.
 - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
 - 2.

2.07 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 C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
 - 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 4100 psi at 28 days when tested in accordance with ASTM C109/C109M.
- 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 C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
 - 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 in accordance with ASTM C109/C109M.

2.08 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, in accordance with ACI 301.
 - 1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.
- B. Admixtures: Use admixtures in accordance with 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 heavy-use industrial slabs and concrete with a w/cm below 0.50.
4. Use permeability-reducing admixture in concrete mixtures where indicated.

2.09 CONCRETE MIXTURES

A. Normal-weight concrete used for footings, grade beams, and tie beams.

1. Exposure Class: ACI 318 F0 S0 W0 C0.
2. Minimum Compressive Strength: As indicated at 28 days.
3. Maximum w/cm: As indicated.
4. Slump Limit: 5 inches, plus or minus 1 inch.
5. Slump Flow Limit: 22 inches, plus or minus 1.5 inches.
6. Air Content:
 - a. Exposure Class F1: 4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch nominal maximum aggregate size.
 - b. Exposure Classes F2 and F3: 6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch nominal maximum aggregate size.

B. Normal-weight concrete used for interior slabs-on-ground.

1. Exposure Class: ACI 318 F0 S0 W1 C0.
2. Minimum Compressive Strength: As indicated at 28 days.
3. Maximum w/cm: As indicated.
4. Slump Limit: 5 inches, plus or minus 1 inch.
5. Slump Flow Limit: 22 inches, plus or minus 1.5 inches.
6. Air Content:
 - a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.

2.10 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M, and furnish batch ticket information.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete in accordance with ASTM C94/C94M. Mix concrete materials in appropriate drum-type batch machine mixer.
 1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
 2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..

3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:

1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
2. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:

1. Daily access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
4. Security and protection for test samples and for testing and inspection equipment at Project site.

3.03 INSTALLATION OF EMBEDDED ITEMS

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.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.04 INSTALLATION OF VAPOR RETARDER

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.

1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
2. Face laps away from exposed direction of concrete pour.
3. Lap vapor retarder over footings and grade beams not less than 6 inches, sealing vapor retarder to concrete.
4. Lap joints 6 inches and seal with manufacturer's recommended tape.

5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
7. Protect vapor retarder during placement of reinforcement and concrete.
 - a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches on all sides, and sealing to vapor retarder.
- B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder in accordance with manufacturer's written instructions.

3.05 JOINTS

- A. Construct joints true to line, with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.
 1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
 2. Place joints perpendicular to main reinforcement.
 - a. Continue reinforcement across construction joints unless otherwise indicated.
 - b. Do not continue reinforcement through sides of strip placements of floors and slabs.
 3. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 5. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:
 1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.
- D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
 2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface, where joint sealants, specified in Section 07 92 00 "Joint Sealants," are indicated.
 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints:

1. Install dowel bars and support assemblies at joints where indicated on Drawings.
2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.

F. Dowel Plates: Install dowel plates at joints where indicated on Drawings.

3.06 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.

1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.

B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.

C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, but not to exceed the amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.

1. If a section cannot be placed continuously, provide construction joints as indicated.
2. Deposit concrete to avoid segregation.
3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.
 - a. Do not use vibrators to transport concrete inside forms.
 - b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
 - c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
 - d. 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.

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

3.07 FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:

1. ACI 301 Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.
 - a. Patch voids larger than 1-1/2 inches wide or 1/2 inch deep.
 - b. Remove projections larger than 1 inch.
 - c. Tie holes do not require patching.
 - d. Surface Tolerance: ACI 117 Class D.
 - e. Apply to concrete surfaces not exposed to public view.
2. ACI 301 Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.
 - a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
 - b. Remove projections larger than 1/4 inch.
 - c. Patch tie holes.
 - d. Surface Tolerance: ACI 117 Class B.
 - e. Locations: Apply to concrete surfaces exposed to public view,.

3.08 FINISHING FLOORS AND SLABS

- A. Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Trowel Finish:
 1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
 2. Continue troweling passes and restraighen until surface is free of trowel marks and uniform in texture and appearance.
 3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 4. Do not add water to concrete surface.

5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
 6. Apply a trowel finish to surfaces exposed to view.
 7. Finish surfaces to the following tolerances, in accordance with ASTM E1155, for a randomly trafficked floor surface:
 - a. Slabs on Ground:
 - 1) Finish and measure surface so gap at any point between concrete surface and an unlevelled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16 inch.
- C. Dry-Shake Floor Hardener Finish: After initial floating, apply dry-shake floor hardener to surfaces in accordance with manufacturer's written instructions and as follows:
1. Uniformly apply dry-shake floor hardener at a rate of 100 lb/100 sq. ft. unless greater amount is recommended by manufacturer.
 2. Uniformly distribute approximately two-thirds of dry-shake floor hardener over surface by hand or with mechanical spreader, and embed by power floating.
 3. Follow power floating with a second dry-shake floor hardener application, uniformly distributing remainder of material, and embed by power floating.
 4. After final floating, apply a trowel finish.
 5. Cure concrete with curing compound recommended by dry-shake floor hardener manufacturer and apply immediately after final finishing.

3.09 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

- A. Filling In:
1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
 2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
 3. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations:
1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 2. Construct concrete bases 4 inches high unless otherwise indicated on Drawings, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated on Drawings, or unless required for seismic anchor support.
 3. Minimum Compressive Strength: 4000 psi at 28 days.
 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.

6. Prior to pouring concrete, place and secure anchorage devices.
 - a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - b. Cast anchor-bolt insert into bases.
 - c. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.10 CONCRETE CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
 1. Comply with ACI 301 and ACI 306.1 for cold weather protection during curing.
 2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
- B. Curing Formed Surfaces: Comply with ACI 308.1 as follows:
 1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
 2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
 3. If forms remain during curing period, moist cure after loosening forms.
 4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:
 - a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
 - b. Continuous Sprinkling: Maintain concrete surface continuously wet.
 - c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
 - d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
 - e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
 - 1) Recoat areas subject to heavy rainfall within three hours after initial application.
 - 2) Maintain continuity of coating and repair damage during curing period.
- C. Curing Unformed Surfaces: Comply with ACI 308.1 as follows:
 1. Begin curing immediately after finishing concrete.
 2. Interior Concrete Floors:
 - a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:
 - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
 - a) Lap edges and ends of absorptive cover not less than 12 inches.

- b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but 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.
 - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - b) Cure for not less than seven days.
 - 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
 - a) Water.
 - b) Continuous water-fog spray.
- b. Floors to Receive Penetrating Liquid Floor Treatments: Contractor has option of the following:
 - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
 - a) Lap edges and ends of absorptive cover not less than 12 inches.
 - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but 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.
 - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - b) Cure for not less than seven days.
 - 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
 - a) Water.
 - b) Continuous water-fog spray.
- c. Floors to Receive Curing Compound:
 - 1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
 - 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
 - 3) Maintain continuity of coating, and repair damage during curing period.
 - 4) 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.

d. Floors to Receive Curing and Sealing Compound:

- 1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
- 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
- 3) Repeat process 24 hours later, and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

3.11 TOLERANCES

- A. Conform to ACI 117.

3.12 APPLICATION OF LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment in accordance with manufacturer's written instructions.

1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
2. Do not apply to concrete that is less than three days' old.
3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing.
4. Rinse with water; remove excess material until surface is dry.
5. Apply a second coat in a similar manner if surface is rough or porous.

- B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller in accordance with manufacturer's written instructions.

3.13 JOINT FILLING

- A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month(s).
2. Do not fill joints until construction traffic has permanently ceased.

- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints.

- D. Overfill joint, and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS

- A. Defective Concrete:

1. Repair and patch defective areas when approved by Architect.
2. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 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.
 - a. Limit cut depth to 3/4 inch.
 - b. Make edges of cuts perpendicular to concrete surface.
 - c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
 - d. Fill and compact with patching mortar before bonding agent has dried.
 - e. 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 matches surrounding color.
 - a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
 - b. Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces:
1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.
 - a. Correct low and high areas.
 - b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 2. Repair finished surfaces containing surface defects, including spalls, popouts, 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.
 3. After concrete has cured at least 14 days, correct high areas by grinding.
 4. Correct localized low areas during, or immediately after, completing surface-finishing operations by cutting out low areas and replacing with patching mortar.
 - a. Finish repaired areas to blend into adjacent concrete.
 5. Correct other low areas scheduled to remain exposed with repair topping.
 - a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations.
 - b. Prepare, mix, and apply repair topping and primer in accordance with 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.

- a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch clearance all around.
 - b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
 - c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
 - d. Place, compact, and finish to blend with adjacent finished concrete.
 - e. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar.
 - a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.
 - b. Dampen cleaned concrete surfaces and apply bonding agent.
 - c. Place patching mortar before bonding agent has dried.
 - d. Compact patching mortar and finish to match adjacent concrete.
 - e. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.15 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.
- B. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
1. Testing agency to be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
 2. Testing agency to immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
 3. Testing agency to report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.
 - a. Test reports to include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:
 - 1) Project name.
 - 2) Name of testing agency.
 - 3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
 - 4) Name of concrete manufacturer.
 - 5) Date and time of inspection, sampling, and field testing.

- 6) Date and time of concrete placement.
 - 7) Location in Work of concrete represented by samples.
 - 8) Date and time sample was obtained.
 - 9) Truck and batch ticket numbers.
 - 10) Design compressive strength at 28 days.
 - 11) Concrete mixture designation, proportions, and materials.
 - 12) Field test results.
 - 13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
 - 14) Type of fracture and compressive break strengths at seven days and 28 days.
- C. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.
- D. Inspections:
1. Headed bolts and studs.
 2. Verification of use of required design mixture.
 3. Concrete placement, including conveying and depositing.
 4. Curing procedures and maintenance of curing temperature.
 5. Verification of concrete strength before removal of shores and forms from beams and slabs.
 6. Batch Plant Inspections: On a random basis, as determined by Architect.
- E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M to be performed in accordance with the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing to be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 2. Slump: ASTM C143/C143M:
 - a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - b. Perform additional tests when concrete consistency appears to change.
 3. Slump Flow: ASTM C1611/C1611M:
 - a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - b. Perform additional tests when concrete consistency appears to change.
 4. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete;.

- a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
5. Concrete Temperature: ASTM C1064/C1064M:
 - a. One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
6. Unit Weight: ASTM C567/C567M fresh unit weight of structural lightweight concrete.
 - a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
7. Compression Test Specimens: ASTM C31/C31M:
 - a. Cast and laboratory cure two sets of two 6-inch by 12-inch or 4-inch by 8-inch cylinder specimens for each composite sample.
 - b. Cast, initial cure, and field cure two sets of two standard cylinder specimens for each composite sample.
8. Compressive-Strength Tests: ASTM C39/C39M.
 - a. Test one set of two laboratory-cured specimens at seven days and one set of two specimens at 28 days.
 - b. Test one set of two field-cured specimens at seven days and one set of two specimens at 28 days.
 - c. A compressive-strength test to be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor to evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi.
11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests:
 - a. Testing and inspecting agency to make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
 - b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.
 - 1) Acceptance criteria for concrete strength to be in accordance with ACI 301, Section 1.6.6.3.

13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- F. Measure floor and slab flatness and levelness in accordance with ASTM E1155 within 48 hours of completion of floor finishing and promptly report test results to Architect.

3.16 PROTECTION

A. Protect concrete surfaces as follows:

1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF CAST-IN-PLACE CONCRETE

SECTION 05 12 00 STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Structural-steel materials.
2. Shrinkage-resistant grout.

B. Related Requirements:

1. Section 05 31 00 "Steel Decking" for field installation of shear stud connectors through deck.
2. Section 05 50 00 "Metal Fabrications" for miscellaneous steel fabrications and other steel items not defined as structural steel.
3. Section 09 96 00 "High-Performance Coatings" for painting requirements.

1.02 DEFINITIONS

- ##### **A. Structural Steel:** Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.

1.03 COORDINATION

- ##### **A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.**
- ##### **B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.**

1.04 PREINSTALLATION MEETINGS

- ##### **A. Preinstallation Conference:** Conduct conference at Project site.

1.05 ACTION SUBMITTALS

A. Product Data:

1. Structural-steel materials.
2. High-strength, bolt-nut-washer assemblies.
3. Anchor rods.
4. Threaded rods.
5. Shop primer.
6. Shrinkage-resistant grout.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment Drawings.

3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
 5. Identify members not to be shop primed.
- C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide in accordance with AWS D1.1/D1.1M for each welded joint whether prequalified or qualified by testing, including the following:
1. Power source (constant current or constant voltage).
 2. Electrode manufacturer and trade name, for demand-critical welds.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, fabricator, and testing agency.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Mill test reports for structural-steel materials, including chemical and physical properties.
- E. Product Test Reports: For the following:
1. Bolts, nuts, and washers, including mechanical properties and chemical analysis.
 2. Direct-tension indicators.
 3. Tension-control, high-strength, bolt-nut-washer assemblies.
- F. Source quality-control reports.
- G. Field quality-control reports.

1.07 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Acceptance Criteria 172).
- B. Installer Qualifications: A qualified Installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.
- C. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.
1. Welders and welding operators performing work on bottom-flange, demand-critical welds are to pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G are to be considered separate processes for welding personnel qualification.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F3125/F3125M, Grade F1852 bolt assemblies and for retesting bolt assemblies after lubrication.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Comply with applicable provisions of the following specifications and documents:
 1. ANSI/AISC 303.
 2. ANSI/AISC 341.
 3. ANSI/AISC 360.
 4. RCSC's "Specification for Structural Joints Using High-Strength Bolts."

2.02 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A992/A992M, ASTM A572/A572M, Grade 50, ASTM A529/A529M, Grade 50, ASTM A913/A913M, Grade 50.
- B. Channels, Angles, M-Shapes: ASTM A36/A36M.
- C. Channels, Angles, S-Shapes: ASTM A36/A36M.
- D. Plate and Bar: ASTM A36/A36M.
- E. Cold-Formed Hollow Structural Sections: ASTM A500/A500M, Grade C, ASTM A1085/ASTMA1085M structural tubing.
- F. Steel Pipe: ASTM A53/A53M, Type E or Type S, Grade B.
- G. Welding Electrodes: Comply with AWS requirements.

2.03 BOLTS AND CONNECTORS

- A. Zinc-Coated High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.
 1. Finish: Hot-dip or mechanically deposited zinc coating.
 2. Direct-Tension Indicators: ASTM F959/F959M, Type 325-1, compressible-washer type with mechanically deposited zinc coating finish.

2.04 RODS

- A. Unheaded Anchor Rods: ASTM F1554, Grade 36, ASTM A36/A36M.
 1. Configuration: Straight.

2. Nuts: ASTM A563 heavy-hex carbon steel.
 3. Plate Washers: ASTM A36/A36M carbon steel.
 4. Washers: ASTM F436, Type 1, hardened carbon steel.
 5. Finish: Hot-dip zinc coating, ASTM A153/A153M, Class C.
- B. Headed Anchor Rods: ASTM F1554, Grade 36, straight.
1. Nuts: ASTM A563 heavy-hex carbon steel.
 2. Plate Washers: ASTM A36/A36M carbon steel.
 3. Washers: ASTM F436, Type 1, hardened carbon steel.
 4. Finish: Hot-dip zinc coating, ASTM A153/A153M, Class C.
- C. Threaded Rods: ASTM A36/A36M.
1. Nuts: ASTM A63 heavy-hex carbon steel.
 2. Washers: ASTM A36/A36M carbon steel.
 3. Finish: Hot-dip zinc coating, ASTM A153/A153M, Class C.
- 2.05 PRIMER
- A. Steel Primer:
1. Comply with Section 09 96 00 "High-Performance Coatings."
 2. SSPC-Paint 23, latex primer.
 3. Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.
- 2.06 SHRINKAGE-RESISTANT GROUT
- A. Metallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.
- 2.07 FABRICATION
- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.
1. Camber structural-steel members where indicated.
 2. Fabricate beams with rolling camber up.
 3. Identify high-strength structural steel in accordance with ASTM A6/A6M and maintain markings until structural-steel framing has been erected.
 4. Mark and match-mark materials for field assembly.
 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.

- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted in accordance with SSPC-SP 1.
- F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.08 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: As indicated.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

2.09 SHOP PRIMING

- A. Shop prime steel surfaces, except the following:
 - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 - 2. Surfaces to be field welded.
 - 3. Surfaces of high-strength bolted, slip-critical connections.
- B. Surface Preparation of Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces in accordance with the following specifications and standards:
 - 1. SSPC-SP 2.
- C. Priming: Immediately after surface preparation, apply primer in accordance with manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

2.10 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform shop tests and inspections.
 - 1. Allow testing agency access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

2. Bolted Connections: Inspect shop-bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
3. Welded Connections: Visually inspect shop-welded connections in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E165/E165M.
 - b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - c. Ultrasonic Inspection: ASTM E164.
 - d. Radiographic Inspection: ASTM E94/E94M.
4. In addition to visual inspection, test and inspect shop-welded shear stud connectors in accordance with requirements in AWS D1.1/D1.1M for stud welding and as follows:
 - a. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear stud connector.
 - b. Conduct tests in accordance with requirements in AWS D1.1/D1.1M on additional shear stud connectors if weld fracture occurs on shear stud connectors already tested.
5. Prepare test and inspection reports.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
 1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated on Drawings.
 1. Do not remove temporary shoring supporting composite deck construction and structural-steel framing until cast-in-place concrete has attained its design compressive strength.

3.03 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.
- B. Baseplates, Bearing Plates, and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 1. Set plates for structural members on wedges, shims, or setting nuts as required.

2. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 3. Promptly pack shrinkage-resistant grout solidly between bearing surfaces and plates, so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for grouting.
- C. Maintain erection tolerances of structural steel within ANSI/AISC 303.
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
1. Level and plumb individual members of structure. Slope roof framing members to slopes indicated on Drawings.
 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection[unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M].
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- 3.04 FIELD CONNECTIONS
- A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.
1. Joint Type: As indicated.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
1. Comply with ANSI/AISC 303 and ANSI/AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 2. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.
- 3.05 REPAIR
- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing, and repair galvanizing to comply with ASTM A780/A780M.
- B. Touchup Painting:
1. Immediately after erection, clean exposed areas where primer is damaged or missing, and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
 2. Cleaning and touchup painting are specified in Section 09 96 00 "High-Performance Coatings."

- C. Touchup Priming: Cleaning and touchup priming are specified in Section 09 96 00 "High-Performance Coatings."

3.06 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform the following special inspections:
 - 1. Verify structural-steel materials and inspect steel frame joint details.
 - 2. Verify weld materials and inspect welds.
 - 3. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
 - 1. Bolted Connections: Inspect bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
 - 2. Welded Connections: Visually inspect field welds in accordance with AWS D1.1/D1.1M.
 - a. In addition to visual inspection, test and inspect field welds in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - 1) Liquid Penetrant Inspection: ASTM E165/E165M.
 - 2) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - 3) Ultrasonic Inspection: ASTM E164.
 - 4) Radiographic Inspection: ASTM E94/E94M.

END OF STRUCTURAL STEEL FRAMING

SECTION 05 31 00 STEEL DECKING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Roof deck.

B. Related Requirements:

1. Section 05 12 00 "Structural Steel Framing" for shop- and field-welded shear connectors.
2. Section 05 50 00 "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.

1.02 ACTION SUBMITTALS

A. Product Data:

1. Roof deck.

B. Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.03 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product Certificates: For each type of steel deck.

C. Test and Evaluation Reports:

1. Product Test Reports: For tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
 - a. Power-actuated mechanical fasteners.
 - b. Acoustical roof deck.
2. Research Reports: For steel deck, from ICC-ES showing compliance with the building code.

D. Field Quality-Control Submittals:

1. Field quality-control reports.

E. Qualification Statements: For welding personnel.

1.04 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with SDI QA/QC and the following welding codes:

1. AWS D1.1/D1.1M.
2. AWS D1.3/D1.3M.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Store products in accordance with SDI MOC3. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS**2.01 PERFORMANCE REQUIREMENTS**

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck in accordance with AISI S100.

2.02 ROOF DECK

- 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. Vulcraft/Vercor Group; a division of Nucor Corp.
- B. Fabrication of Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with SDI RD and with the following:
 - 1. Galvanized-Steel Sheet: ASTM A653/A653M, Structural Steel (SS), Grade 33, G90 zinc coating.
 - 2. Deck Profile: As indicated.
 - 3. Profile Depth: As indicated.
 - 4. Design Uncoated-Steel Thickness: As indicated.
 - 5. Span Condition: As indicated.
 - 6. Side Laps: Overlapped or interlocking seam at Contractor's option.

2.03 ACCESSORIES

- A. Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Galvanizing Repair Paint: [ASTM A780/A780M] [SSPC-Paint 20 or MIL-P-21035B, with dry film containing a minimum of 94 percent zinc dust by weight].
- G. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION**3.01 EXAMINATION**

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

- A. Install deck panels and accessories in accordance with SDI C, SDI NC, and SDI RD, as applicable; manufacturer's written instructions; and requirements in this Section.
- B. Install temporary shoring before placing deck panels if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install in accordance with deck manufacturer's written instructions. Submit supporting documentation indicating that mechanical fasteners achieve the required wind uplift and diaphragm shear strength indicated in the drawings.

3.03 INSTALLATION OF ROOF DECK

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long, and as follows:
 - 1. Weld Diameter: As indicated.
 - 2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds as indicated.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 18 inches as indicated, using one of the following methods as indicated in drawings:
 - 1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
 - 2. Mechanically clinch or button punch.
 - 3. Fasten with a minimum of 1-1/2-inch-long welds.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
 - 1. End Joints: Lapped 2 inches minimum or butted at Contractor's option.

- D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld or mechanically fasten flanges to top of deck. Space welds / mechanical fasteners not more than 12 inches apart with at least one weld / fastener at each corner.
- E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels in accordance with deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.
 - 1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.
- F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive in accordance with manufacturer's written instructions to ensure complete closure.

3.04 REPAIR

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint in accordance with ASTM A780/A780M and manufacturer's written instructions.
- B. Repair Painting:
 - 1. Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.
 - 2. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
 - 3. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Section 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting."
 - 4. Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Section 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting."

3.05 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Tests and Inspections:
 - 1. Special inspections and qualification of welding special inspectors for cold-formed steel floor and roof deck in accordance with quality-assurance inspection requirements of SDI QA/QC.
 - a. Field welds will be subject to inspection.
 - 2. Steel decking will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

END OF STEEL DECKING

SECTION 05 40 00 COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Exterior non-load-bearing wall framing.

B. Related Requirements:

1. Section 05 50 00 "Metal Fabrications" for miscellaneous steel shapes, masonry shelf angles, and connections used with cold-formed metal framing.
2. Section 09 22 16 "Non-Structural Metal Framing" for standard, interior non-load-bearing, metal-stud framing, with height limitations and ceiling-suspension assemblies.

1.02 ACTION SUBMITTALS

A. Product Data: For the following:

1. Cold-formed steel framing materials.
2. Exterior non-load-bearing wall framing.
3. Vertical deflection clips.
4. Post-installed anchors.
5. Power-actuated anchors.

B. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

C. Delegated Design Submittal: For cold-formed steel framing.

1.03 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Product Certificates: For each type of code-compliance certification for studs and tracks.

D. Product Test Reports: For each listed product, for tests performed by [manufacturer and witnessed by a qualified testing agency] [a qualified testing agency].

1. Steel sheet.
2. Expansion anchors.
3. Power-actuated anchors.
4. Mechanical fasteners.
5. Miscellaneous structural clips and accessories.

1.04 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.
- B. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment, indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- C. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association the Steel Framing Industry Association the Steel Stud Manufacturers Association or the Supreme Steel Framing System Association.
- D. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
- E. Comply with AISI S230 "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect and store cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling as required in AISI S202.

PART 2 - PRODUCTS

2.01 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. CEMCO; California Expanded Metal Products Co.
 - 2. MRI Steel Framing, LLC.
 - 3. Mill Steel Framing; Mill Steel Company.
 - 4. SCAFCO Steel Stud Company; Stone Group of Companies.

2.02 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design cold-formed steel framing.
- B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
 - 1. Design Loads: As indicated on Drawings.
 - 2. Deflection Limits: Design framing systems to withstand service-level (ASD) loads without deflections greater than the following:
 - a. Exterior Non-Load-Bearing Framing: Horizontal deflection of L/180 of the wall height.
 - 3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection

failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.

4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
 - a. Upward and downward movement of $L/240$ (based on span of structural member).
 - C. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing complies with AISI S100 and AISI S240.
- 2.03 COLD-FORMED STEEL FRAMING MATERIALS
- A. Framing Members, General: Comply with AISI S240 for conditions indicated.
 - B. Steel Sheet: ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:
 1. Grade: As required by structural performance.
 2. Coating: G90 or equivalent.
 - C. Steel Sheet for Vertical Deflection Clips: ASTM A653/A653M, structural steel, zinc coated, of grade and coating as follows:
 1. Grade: As required by structural performance.
 2. Coating: G90.
- 2.04 EXTERIOR NON-LOAD-BEARING WALL FRAMING
- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 1. Minimum Base-Metal Thickness: 0.0329 inch.
 2. Flange Width: 1-3/8 inches minimum..
 - B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
 1. Minimum Base-Metal Thickness: 0.0329 inch minimum, Matching steel studs.
 2. Flange Width: 1-1/4 inches.
 - C. Vertical Deflection Clips, Exterior: Manufacturer's standard bypass clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
- 2.05 FRAMING ACCESSORIES
- A. Fabricate steel-framing accessories from ASTM A1003/A1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.
 - B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 1. Supplementary framing.
 2. Bracing, bridging, and solid blocking.
 3. Web stiffeners.

4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Hole-reinforcing plates.
8. Backer plates.

2.06 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A36/A36M, zinc coated by hot-dip process according to ASTM A123/A123M.
- B. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 ICC-ES AC193 ICC-ES AC58 or ICC-ES AC308 as appropriate for the substrate.
 1. Uses: Securing cold-formed steel framing to structure.
- C. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.
- E. Welding Electrodes: Comply with AWS standards.

2.07 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A780/A780M MIL-P-21035B or SSPC-Paint 20.

2.08 FABRICATION

- A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 1. Fabricate framing assemblies using jigs or templates.
 2. Cut framing members by sawing or shearing; do not torch cut.
 3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.
 4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.

- C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet and as follows:
 - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error are not to exceed minimum fastening requirements of sheathing or other finishing materials.
 - 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, conditions, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
- D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

3.03 INSTALLATION OF EXTERIOR NONLOADBEARING WALL FRAMING

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: As indicated on Drawings.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 - 1. Connect vertical deflection clips to bypassing studs and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
 - 1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 - 2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 - 3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.04 INSTALLATION TOLERANCES

- A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error are not to exceed minimum fastening requirements of sheathing or other finishing materials.

3.05 REPAIR

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

3.06 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.

- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.07 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF COLD-FORMED METAL FRAMING

SECTION 07 41 16 INSULATED METAL ROOF PANELS

PART 1 - GENERAL

1.01 Summary

- A. Section Includes: Foamed-insulation-core metal roof panels.
- B. Related Requirements:
 - 1. Section 07 42 93 "Soffit Panels" for metal panels used in horizontal soffit applications.
 - 2. Section 07 72 53 "Snow Guards" for prefabricated devices designed to hold snow on the roof surface, allowing it to melt and drain off slowly.

1.02 Preinstallation Meetings

- A. Meet with Owner, Architect, Owner's insurer if applicable, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of roof accessories and roof-mounted equipment.
- B. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
- C. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
- D. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
- E. Review structural loading limitations of purlins and rafters during and after roofing.
- F. Review flashings, special details, drainage, penetrations, equipment curbs, and condition of other construction that affect metal panels.
- G. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
- H. Review temporary protection requirements for metal panel systems during and after installation.
- I. Review of procedures for repair of metal panels damaged after installation.
- J. Document proceedings, including corrective measures and actions required, and furnish a copy of record to each participant.

1.03 Action Submittals

- A. Product Data: For foamed-insulation-core metal roof panels. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Shop Drawings:
 - 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
 - 2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches (1:10).
- C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.
 - 1. Include similar Samples of trim and accessories involving color selection on same material as panel.

1.04 Informational Submittals

- A. Qualification Data: For Installer.
- B. Product Test Reports: For foamed-insulation-core metal roof panels, for tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For special warranties.

1.05 Closeout Submittals

- A. Maintenance Data: For metal panels to be included in maintenance manuals.

1.06 Quality Assurance

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.07 Delivery, Storage, and Handling

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels during installation.

1.08 Field Conditions

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.09 Coordination

- A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.
- B. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 Warranty

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
 - 2. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.
- C. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
 - 1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 Performance Requirements

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E72:

1. Wind Loads: As indicated on Drawings.
 2. Other Design Loads: As indicated on Drawings.
 3. Deflection Limits: For wind loads, no greater than 1/240 of the span.
- B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E1680 or ASTM E283 at the following test-pressure difference:
1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E1646 or ASTM E331 at the following test-pressure difference:
1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- D. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
1. Uplift Rating: UL 30.
 2. Hail Resistance: Moderate hail.
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): [120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.02 Foamed-Insulation-Core Metal Roof Panels

- A. Provide factory-formed and -assembled metal roof panels fabricated from two sheets of metal with insulation core foamed in place during fabrication with joints between panels designed to form weathertight seals. Include accessories required for weathertight installation.
1. Panel Performance:
 - a. Flatwise Tensile Strength: 30 psi when tested according to ASTM C297/C297M.
 - b. Humid Aging: Volume increase not greater than 6.0 percent and no delamination or metal corrosion when tested for seven days at 140 deg F and 100 percent relative humidity according to ASTM D2126.
 - c. Heat Aging: Volume increase not greater than 2.0 percent and no delamination, surface blistering, or permanent bowing when tested for seven days at 200 deg F according to ASTM D2126.
 - d. Cold Aging: Volume decrease not more than 1.0 percent and no delamination, surface blistering, or permanent bowing when tested for seven days at minus 20 deg F according to ASTM D2126.

- e. Fatigue: No evidence of delamination, core cracking, or permanent bowing when tested to a 20-lbf/sq. ft. positive and negative wind load and with deflection of L/180 for 2 million cycles.
- f. Autoclave: No delamination when exposed to 2-psi pressure at a temperature of 212 deg F for 2-1/2 hours.
- g. Fire-Test-Response Characteristics: Class A according to ASTM E108.
- 2. Insulation Core: Modified isocyanurate or polyurethane foam using a non-CFC blowing agent, with maximum flame-spread and smoke-developed indexes of 25 and 450, respectively.
 - a. Closed-Cell Content: 90 percent when tested according to ASTM D6226.
 - b. Density: 2.0 to 2.6 lb/cu. ft. when tested according to ASTM D1622.
 - c. Compressive Strength: Minimum 20 psi when tested according to ASTM D1621.
 - d. Shear Strength: 26 psi when tested according to ASTM C273.
- B. Lap-Seam-Profile, Foamed-Insulation-Core Metal Roof Panels: Formed for lapping side edges of adjacent panels and mechanically attaching to supports using exposed fasteners in side laps.

Basis of Design:

- 1. King Span King Seam Roof Panel System
- 2. Metallic-Coated Steel Sheet: Facings of zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation; structural quality. Pre-painted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Nominal Thickness: 0.022 inch.
 - b. Exterior Finish: Two-coat fluoropolymer.
 - 1) Color: As selected by Architect from manufacturer's full range.
 - c. Interior Finish: Stucco/non-embossed.
 - 1) Color: As selected by Architect from manufacturer's full range.
- 3. Batten: Same material, finish, and color as exterior facings of roof panels.
- 4. Panel Coverage: 30 inches.
- 5. Panel Thickness: 5 inches.
- 6. Thermal-Resistance Value (R-Value): 46 according to ASTM C1363.
- C. Standing-Seam-Profile, Foamed-Insulation-Core Metal Roof Panels: Formed with vertical tongue-and-groove ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by interlocking tongue-and-groove panel edges and mechanically attaching panels to supports using

concealed clips located between panels and engaging edges of adjacent panels, and mechanically seaming panels together.

1. King Span King Standing Seam Roof Panel System
2. Metallic-Coated Steel Sheet: Facings of zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation; structural quality. Pre-painted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Nominal Thickness: 0.022 inch.
 - b. Exterior Finish: Two-coat fluoropolymer.
 - 1) Color: As selected by Architect from manufacturer's full range.
 - c. Interior Finish: Siliconized polyester.
 - 1) Color: As selected by Architect from manufacturer's full range.
3. Joint Type: Double folded.
4. Panel Coverage: 42 inches.
5. Panel Thickness: 3.25 inches.
6. Thermal-Resistance Value (R-Value): 46 according to ASTM C1363.

2.03 Miscellaneous Materials

- A. Miscellaneous Metal Sub framing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
 1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch thick, flexible closure strips; cut or pre-molded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as exterior facings of metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases,

framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

- D. Roof Curbs: Fabricated from same material, finish, and color as exterior facings of roof panels, 0.048-inch nominal thickness; with bottom of skirt profiled to match roof panel profiles and with welded top box and integral full-length cricket. Fabricate curb sub framing of 0.060-inch nominal thickness, angle-, C-, or Z-shaped steel sheet. Fabricate curb and sub framing to withstand indicated loads of size and height indicated. Finish roof curbs to match metal roof panels.
 - 1. Insulate roof curb with 1-inch thick, rigid insulation.
- E. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- F. Panel Sealants: Provide sealant types recommended by the manufacturer that are compatible with panel materials, are non-staining, and do not damage panel finish.
 - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
 - 2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
 - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.04 Fabrication

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
 - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
3. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application but not less than thickness of metal being secured.

2.05 Finishes

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Exterior Facings and Accessories:
 1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- D. Interior Facings:
 1. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil for primer and 0.8 mil for topcoat.

PART 3 - EXECUTION

3.01 Examination

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
 1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.

- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 Preparation

- A. Miscellaneous Supports: Install sub framing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

3.03 Installation of Foamed-Insulation-Core Metal Roof Panels

- A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Apply continuous ribbon of sealant to panel joint on concealed side of insulated metal roof panels as vapor seal; apply sealant to panel joint on exposed side of panels for weather seal.
 - 2. Shim or otherwise plumb substrates receiving metal panels.
 - 3. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 - 4. Install screw fasteners in predrilled holes.
 - 5. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 6. Install flashing and trim as metal panel work proceeds.
 - 7. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 - 8. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 - 9. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners: Use stainless steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
- C. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.
- D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

- E. Standing-Seam, Foamed-Insulation-Core Metal Roof Panels: Fasten insulated metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.
 - 1. Install clips to supports with self-tapping fasteners.
 - 2. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so cleat, insulated metal roof panel, and factory-applied side-lap sealant are completely engaged.
- F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal roof panel manufacturers; or, if not indicated, provide types recommended in writing by metal roof panel manufacturer.
- G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible and set units true to line and level. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
 - 1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof performance.
 - 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- H. Roof Curbs: Install flashing around bases where they meet metal roof panels.
- I. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.04 Erection Tolerances

- A. Installation Tolerances: Shim and align metal panel units within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.05 Field Quality Control

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal panel installation, including accessories. Report results in writing.

- B. Remove and replace applications where tests and inspections indicate that they do not comply with specified requirements.
- C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- D. Prepare test and inspection reports.

3.06 Cleaning and Protection

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF INSULATED METAL ROOF PANELS

SECTION 07 42 13.13 FORMED METAL WALL PANELS

PART 1 - GENERAL

1.01 Summary

A. Section Includes:

1. Concealed-fastener, lap-seam metal wall panels.

B. Related Requirements:

1. Section 07 42 93 "Soffit Panels" for metal panels used in horizontal soffit applications.

1.02 Preinstallation Meetings

A. Preinstallation Conference: Conduct conference at (project address?) Bethel, AK.

1. Meet with Owner, Architect, Owner's insurer if applicable, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of doors, windows, and louvers.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect metal panels.
6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
7. Review temporary protection requirements for metal panel assembly during and after installation.
8. Review of procedures for repair of metal panels damaged after installation.
9. Document proceedings, including corrective measures and actions required, and furnish a copy of record to each participant.

1.03 Action Submittals

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

1. Exposed-fastener, lap-seam metal wall panels.

2. Concealed-fastener, lap-seam metal wall panels.
 3. Metal liner panels.
 - B. Shop Drawings:
 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
 2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches (1:10).
 - C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied finishes.
 1. Include Samples of trim and accessories involving color selection.
- 1.04 Informational Submittals
- A. Qualification Data: For Installer.
 - B. Product Test Reports: For concealed-fastener, lap-seam metal wall panels for tests performed by a qualified testing agency.
 - C. Field quality-control reports.
 - D. Sample Warranties: For special warranties.
- 1.05 Closeout Submittals
- A. Maintenance Data: Metal panels to be included in maintenance manuals.
- 1.06 Quality Assurance
- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- 1.07 Delivery, Storage, and Handling
- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
 - B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
 - C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
 - D. Retain strippable protective covering on metal panels during installation.
 - E. Copper Panels: Wear gloves when handling to prevent fingerprints and soiling of surface.

1.08 Field Conditions

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.09 Coordination

- A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 Warranty

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
 - 2. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS**2.01 Performance Requirements**

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
 - 1. Wind Loads: As indicated on Drawings.
 - 2. Other Design Loads: As indicated on Drawings.
 - 3. Deflection Limits: For wind loads, no greater than 1/180 of the span.
- B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E283 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 6.24 lbf/sq. ft.

- C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 6.24 lbf/sq. ft.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- E. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.02 Concealed-Fastener, Lap-Seam Metal Wall Panels

- A. Provide factory-formed metal panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.
- B. Flush-Profile, Concealed-Fastener Metal Wall Panels: Formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced between panel edges; with flush joint between panels.
 - 1. King Span King Seam Insulated Metal Panels
 - 2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation; structural quality. Pre-painted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Nominal Thickness: 0.022 inch.
 - b. Exterior Finish: Two-coat fluoropolymer.
 - c. Color: As selected by Architect from manufacturer's full range.
 - 3. Aluminum Sheet: Coil-coated sheet, ASTM B209 (ASTM B209M), alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
 - a. Thickness: 0.032 inch.
 - b. Surface: Smooth, flat finish.
 - c. Exterior Finish: Two-coat fluoropolymer.
 - d. Color: As selected by Architect from manufacturer's full range.

4. Panel Width: 30 inches (762 mm).
5. Panel Thickness: 3 inches (76.2 mm).
6. Panel Joint Orientation: Horizontal

2.03 Miscellaneous Materials

- A. Miscellaneous Metal Sub framing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 (Z275) hot-dip galvanized coating designation or ASTM A792/A792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
 1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal panels.
 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or pre-molded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, end walls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
 2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.04 Fabrication

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
 - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - 2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 3. Sealed Joints: Form non expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 - 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - 5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.05 Finishes

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Steel Panels and Accessories:
 - 1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat.

Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions [for seacoast and severe environments].

2. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 0.8 mil (0.02 mm) for topcoat.
3. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

PART 3 - EXECUTION

3.01 Examination

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
 1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
 2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking, and that installation is within flatness tolerances required by metal wall panel manufacturer.
 - a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 Preparation

- A. Miscellaneous Supports: Install sub framing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

3.03 Installation of Metal Panels

- A. Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 1. Shim or otherwise plumb substrates receiving metal panels.

2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 3. Install screw fasteners in predrilled holes.
 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 5. Install flashing and trim as metal panel work proceeds.
 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
1. Steel Panels: Use stainless steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.
 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
 5. Flash and seal panels with weather closures at perimeter of all openings.
- E. Watertight Installation:
1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels; and elsewhere as needed to make panels watertight.
 2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.

3. At panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with sealant and fastened together by interlocking clamping plates.
- F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
 1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal wall panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.
- G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
 1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

3.04 Field Quality Control

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Water-Spray Test: After installation, test area of assembly for water penetration according to AAMA 501.2.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal wall panel installation, including accessories.
- D. Remove and replace metal wall panels where tests and inspections indicate that they do not comply with specified requirements.
- E. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- F. Prepare test and inspection reports.

3.05 Cleaning and Protection

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as

recommended by metal panel manufacturer. Maintain in a clean condition during construction.

- B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF FORMED METAL WALL PANELS

SECTION 07 42 93 SOFFIT PANELS

PART 1 - GENERAL

1.01 Summary

A. Section Includes:

1. Metal soffit panels.

B. Related Requirements:

1. Section 07 42 13.13 "Formed Metal Wall Panels" for lap-seam metal wall panels.

1.02 Preinstallation Meetings

- ##### **A. Preinstallation Conference:** Conduct conference at project site Bethel, AK.

1.03 Action Submittals

A. Product Data:

1. Metal soffit panels.

B. Product Data Submittals:

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

C. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
2. Accessories: Include details of flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches (1:10).

D. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

E. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Metal Panels: 12 inches (305 mm) long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.04 Informational Submittals

A. Qualification Data: For Installer.

B. Product Test Reports: For each product, tests performed by a qualified testing agency.

C. Sample Warranties: For special warranties.

1.05 Closeout Submittals

- A. Maintenance Data: For metal panels to include in maintenance manuals.

1.06 Quality Assurance

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.07 Delivery, Storage, and Handling

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels during installation.
- E. Copper Panels: Wear gloves when handling to prevent fingerprints and soiling of surface.

1.08 Field Conditions

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.09 Coordination

- A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 Warranty

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
 - 2. Warranty Period: Two years from date of Substantial Completion.

- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 Performance Requirements

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
1. Wind Loads: As indicated on Drawings.
 2. Other Design Loads: As indicated on Drawings.
 3. Deflection Limits: For wind loads, no greater than 1/240 of the span.
- B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E283 at the following test-pressure difference:
1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:
1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C).

2.02 Metal Soffit Panels

- A. Provide metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.
- B. Metal Soffit Panels: Match profile and material of metal roof panels.

1. Finish: As indicated on Drawings.
 2. Sealant: Factory applied within interlocking joint.
- C. Flush-Profile Metal Soffit Panels: Solid panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced between panel edges; with flush joint between panels.
1. Material: Same material, finish, and color as metal roof panels.
 2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation; structural quality. Pre-painted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Nominal Thickness: 0.022 inch (0.56 mm).
 - b. Exterior Finish: Two-coat fluoropolymer.
 - c. Color: As selected by Architect from manufacturer's full range.
 3. Aluminum Sheet: Coil-coated sheet, ASTM B209 (ASTM B209M), alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
 - a. Thickness: 0.032 inch (0.81 mm).
 - b. Surface: Smooth, flat finish.
 - c. Exterior Finish: Two-coat fluoropolymer.
 - d. Color: As selected by Architect from manufacturer's full range.
 4. Stainless Steel Sheet: ASTM A240/A240M, Type 304, fully annealed.
 - a. Nominal Thickness: 0.0188 inch (0.477 mm).
 - b. Exterior Finish: ASTM A480/A480M No. 4.
 5. Copper Sheet: ASTM B370, cold-rolled copper sheet, H00 temper.
 - a. Thickness: 16 oz./sq. ft. (0.55 mm thick).
 - b. Exposed Finish: Mill.
 6. Panel Width: 30 inches (762 mm).
 7. Panel Thickness: 3.0 inches (76 mm).

2.03 Miscellaneous Materials

- A. Miscellaneous Metal Sub framing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 (Z275) hot-dip galvanized coating designation or ASTM A792/A792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
 - 1. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or pre-molded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and thick.
 - 2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
 - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.04 Fabrication

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

- E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 4. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal soffit panel manufacturer for application but not less than thickness of metal being secured.

2.05 Finishes

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Steel Panels and Accessories:
1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions [for seacoast and severe environments].
 2. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 0.8 mil (0.02 mm) for topcoat.

3. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).
- D. Aluminum Panels and Accessories:
1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions [for seacoast and severe environments].
 2. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 0.8 mil (0.02 mm) for topcoat.
 3. Exposed Anodized Finish:
 - a. Clear Anodic Finish: AAMA 611, [AA-M12C22A41, Class I, 0.018 mm] or thicker.
- E. Stainless Steel Panels and Accessories:
1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
 2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - a. Run grain of directional finishes with long dimension of each piece.
 - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - c. Directional Satin Finish: ASTM A480/A480M No. 4.
 3. Bright, Cold-Rolled, Unpolished Finish: ASTM A480/A480M No. 2B.

PART 3 - EXECUTION

3.01 Examination

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
1. Examine framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal panel manufacturer.
 2. Examine sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal panel manufacturer.

- a. Verify that air- or water-resistive barriers been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 Preparation

- A. Miscellaneous Supports: Install sub framing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.
 1. Soffit Framing: Wire tie or clip furring channels to supports as required to comply with requirements for assemblies indicated.

3.03 Installation of Metal Soffit Panels

- A. Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 1. Shim or otherwise plumb substrates receiving metal panels.
 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 3. Install screw fasteners in predrilled holes.
 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 5. Install flashing and trim as metal panel work proceeds.
 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 7. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
 1. Steel Panels: Use stainless steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
 2. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
 3. Copper Panels: Use copper, stainless steel, or hardware-bronze fasteners.
 4. Stainless Steel Panels: Use stainless steel fasteners.

- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
 - 1. Apply panels and associated items true to line for neat and weathertight enclosure.
 - 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
 - 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 - 4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
- E. Watertight Installation:
 - 1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels and elsewhere as needed to make panels watertight.
 - 2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
 - 3. At panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with sealant and fastened together by interlocking clamping plates.
- F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install components required for a complete metal panel system including trim, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.
- G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
 - 1. Install exposed flashing and trim that is without buckling, and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to achieve waterproof performance.
 - 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) of corner or intersection. Where lapped

expansion provisions cannot be used or would not be waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

3.04 Cleaning and Protection

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SOFFIT PANELS

SECTION 07 72 53 SNOW GUARDS

PART 1 - GENERAL

1.01 Summary

A. Section Includes:

1. Rail-type, seam-mounted snow guards.

1.02 Action Submittals

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Include roof plans showing layouts and attachment details of snow guards.

1. Include details of rail-type snow guards.

C. Delegated Design Submittals: For snow guards, include analysis reports signed and sealed by the qualified professional engineer responsible for their preparation.

1. Include calculation of number and location of snow guards.

1.03 Informational Submittals

A. Qualification Data: For professional engineer's experience with providing delegated design engineering services of the kind indicated, including documentation that the engineer is licensed in the state in which the Project is located.

B. Product Test Reports: For each type of snow guard, for tests performed by a qualified testing agency, indicating load at failure of attachment to roof system identical to roof system used on this Project.

1.04 Field Conditions

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit adhesive-mounted snow guards to be installed, and adhesive cured, according to adhesive manufacturer's written instructions.

PART 2 - PRODUCTS

2.01 Performance Requirements

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design snow guards, including attachment to roofing material and roof deck, as applicable for attachment method, based on the following:

1. Roof snow load.

2. Snow drifting
 3. Roof slope.
 4. Roof type.
 5. Roof dimensions.
 6. Roofing substrate type and thickness.
 7. Snow guard type.
 8. Snow guard fastening method and strength.
 9. Snow guard spacing.
 10. Coefficient of Friction Between Snow and Roof Surface: 0.
 11. Factor of Safety: 2.
- B. Performance Requirements: Provide snow guards that withstand exposure to weather and resist thermally induced movement without failure, rattling, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.
1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- C. Structural Performance: Snow guards to withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.
1. Snow Loads: As indicated on Drawings.

2.02 Rail-Type Snow Guards

A. Rail-Type, Seam-Mounted Snow Guards:

1. Description: Snow guard rails fabricated from metal pipes, bars, or extrusions, anchored to brackets and equipped with three rails.
2. Bars: ASTM B221 (ASTM B221M) aluminum; mill finish.
 - a. Profile: Round with integral track to accept color-matching inserts of material and finish used for metal roof.
3. Seam Clamps: ASTM B221 (ASTM B221M) aluminum extrusion or ASTM B85/B85M aluminum casting with stainless steel set screws incorporating round nonpenetrating point; designed for use with applicable roofing system to which clamp is attached.

PART 3 - EXECUTION

3.01 Examination

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, snow guard attachment, and other conditions affecting performance of the Work.

1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - B. Proceed with installation only after unsatisfactory conditions have been corrected.
- 3.02 Preparation
- A. Clean and prepare substrates for bonding snow guards.
 - B. Prime substrates according to snow guard manufacturer's written instructions.
- 3.03 Installation
- A. Install snow guards according to manufacturer's written instructions.
 1. Space rows as indicated on Shop Drawings.
 - B. Attachment for Standing-Seam Metal Roofing:
 1. Do not use fasteners that will penetrate metal roofing or fastening methods that void metal roofing finish warranty.
 2. Rail-Type, Seam-Mounted Snow Guards:
 - a. Install brackets to vertical ribs in straight rows.
 - b. Secure with stainless steel set screws, incorporating round nonpenetrating point, on same side of standing seam.
 - c. Torque set screw in accordance with manufacturer's written instructions.
 - d. Install cross members to brackets.

END OF SNOW GUARDS

SECTION 08 11 13 HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 Summary

A. Section Includes:

1. Exterior standard steel doors and frames.
2. Exterior custom hollow-metal doors and frames.

B. Related Requirements:

1. Section 08 71 00 "Door Hardware" for door hardware for hollow-metal doors.

1.02 Definitions

- ##### **A. Minimum Thickness:** Minimum thickness of base metal without coatings in accordance with NAAMM-HMMA 803 or ANSI/SDI A250.8.

1.03 Coordination

- ##### **A.** Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- ##### **B.** Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.04 Preinstallation Meetings

- ##### **A. Preinstallation Conference:** Conduct conference at Project site.

1.05 Action Submittals

A. Product Data:

1. Exterior standard steel doors and frames.
2. Exterior custom hollow-metal doors and frames.

B. Product Data Submittals: For each product.

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.

C. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.

3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 4. Locations of reinforcement and preparations for hardware.
 5. Details of each different wall opening condition.
 6. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
 7. Details of anchorages, joints, field splices, and connections.
 8. Details of accessories.
 9. Details of moldings, removable stops, and glazing.
- D. Samples for Initial Selection: For hollow-metal doors and frames with factory-applied color finishes.
- E. Samples for Verification:
1. Finishes: For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches (75 by 127 mm).
 2. Fabrication: Prepare Samples approximately 12 by 12 inches (305 by 305 mm) to demonstrate compliance with requirements for quality of materials and construction:
 - a. Doors: Show vertical-edge, top, and bottom construction; core construction; and hinge and other applied hardware reinforcement. Include separate section showing glazing if applicable.
 - b. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow-metal panels and glazing if applicable.
- F. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.06 Informational Submittals

- A. Qualification Data: For door inspector.
1. Fire-Rated Door Inspector: Submit documentation of compliance with NFPA 80, Section 5.2.3.1.
 2. Egress Door Inspector: Submit documentation of compliance with NFPA 101, Section 7.2.1.15.4.
 3. Submit copy of DHI Fire and Egress Door Assembly Inspector (FDAI) certificate.
- B. Product Test Reports: For each type of fire-rated hollow-metal door and frame assembly and thermally rated door assemblies for tests performed by a qualified testing agency indicating compliance with performance requirements.
- C. Field quality-control reports.

1.07 Closeout Submittals

- A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.08 Quality Assurance

- A. Fire-Rated Door Inspector Qualifications: Inspector for field quality-control inspections of fire-rated door assemblies is to meet the qualifications set forth in NFPA 80, Section 5.2.3.1 and the following:
 - 1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.
- B. Egress Door Inspector Qualifications: Inspector for field quality-control inspections of egress door assemblies is to meet the qualifications set forth in NFPA 101, Section 7.2.1.15.4 and the following:

1.09 Delivery, Storage, and Handling

- A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.
 - 1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch- (102-mm-) high wood blocking. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

PART 2 - PRODUCTS**2.01 Hollow Metal Doors and Frames**

- 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. Ceco Door, ASSA ABLOY.
 - 2. Curries Company; ASSA ABLOY.
 - 3. Republic Doors and Frames.
 - 4. Timely Frames

2.02 Performance Requirements

- A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings and temperature-rise limits indicated on Drawings, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.

1. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.
2. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
- B. Fire-Rated, Borrowed-Lite Assemblies: Assemblies complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing in accordance with NFPA 257 or UL 9.
- C. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.40 deg Btu/F x h x sq. ft. (2.27 W/K x sq. m) when tested in accordance with ASTM C1363.

2.03 Exterior Standard Steel Doors and Frames

- A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 2; ANSI/SDI A250.4, Level B. At locations indicated in the Door and Frame Schedule on Drawings.
 1. Doors:
 - a. Type: As indicated in the Door and Frame Schedule on Drawings.
 - b. Thickness: 1-3/4 inches (44.5 mm).
 - c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch (1.0 mm), with minimum A40 (ZF120) coating.
 - d. Edge Construction: Model 1, Full Flush.
 - e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
 - f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
 - g. Bottom Edges: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
 - h. Core: Manufacturer's standard Polystyrene.
 - i. Fire-Rated Core: Manufacturer's standard laminated mineral board core for fire-rated doors.
 2. Frames:

- a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm), with minimum A40 (ZF120) A60 (ZF180) coating.
 - b. Construction: Full profile welded.
- 3. Exposed Finish: Factory painted.
- C. Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A. At locations indicated in the Door and Frame Schedule on Drawings.
 - 1. Doors:
 - a. Type: As indicated in the Door and Frame Schedule 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 A60 (ZF180) coating.
 - d. Edge Construction: Model 1, Full Flush.
 - e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
 - f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
 - g. Bottom Edges: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
 - h. Core: Manufacturer's standard Polystyrene.
 - i. Fire-Rated Core: Manufacturer's standard laminated mineral board core for fire-rated doors.
 - 2. Frames:
 - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm), with minimum A60 (ZF180) coating.
 - b. Construction: Full profile welded.
 - 3. Exposed Finish: Factory painted.
- D. Maximum-Duty Doors and Frames: ANSI/SDI A250.8, Level 4; ANSI/SDI A250.4, Level A. At locations indicated in the Door and Frame Schedule on Drawings.
 - 1. Doors:
 - a. Type: As indicated in the Door and Frame Schedule on Drawings.
 - b. Thickness: 1-3/4 inches (44.5 mm).
 - c. Face: Metallic-coated steel sheet, minimum thickness of 0.067 inch (1.7 mm), with minimum A60 (ZF180) coating.
 - d. Edge Construction: Model 1, Full Flush.

- e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
 - f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
 - g. Bottom Edges: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
 - h. Core: Manufacturer's standard Polystyrene.
 - i. Fire-Rated Core: Manufacturer's standard laminated mineral board core for fire-rated doors.
- 2. Frames:
 - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.067 inch (1.7 mm), with minimum A40 (ZF120) A60 (ZF180) coating.
 - b. Construction: Full profile welded.
 - 3. Exposed Finish: Factory painted.

2.04 Exterior Custom Hollow-Metal Doors and Frames

A. Commercial Doors and Frames: NAAMM-HMMA 861; ANSI/SDI A250.4, Physical Performance Level A. At locations indicated in the Door and Frame Schedule on Drawings.

- 1. Doors:
 - a. Type: As indicated in the Door and Frame Schedule on Drawings.
 - b. Thickness: 1-3/4 inches (44.5 mm).
 - c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.30 mm), with minimum A60 (ZF180) coating.
 - d. Edge Construction: Continuously welded with no visible seam.
 - e. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
 - f. Bottom Edges: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
 - g. Core: Steel stiffened.
- 2. Frames:
 - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm), except 0.067 inch (1.7 mm) for openings exceeding 4 feet (1219 mm) wide; with minimum A60 (ZF180) coating.
 - b. Construction: Full profile welded.

3. Exposed Finish: Prime.

2.05 Hollow-Metal Panels

- A. Provide hollow-metal panels of same materials, construction, and finish as adjacent door assemblies.

2.06 Frame Anchors

A. Jamb Anchors:

1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches (610 mm) of frame height above 7 feet (2.1 m).
3. Post-installed Expansion Anchor: Minimum 3/8-inch- (9.5-mm-) diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.

- B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.

- C. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch (51-mm) height adjustment. Terminate bottom of frames at top of underlayment.

- D. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized in accordance with ASTM A153/A153M, Class B.

2.07 Materials

- A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

- B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

- C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.

- D. Inserts, Bolts, and Fasteners: Hot-dip galvanized in accordance with ASTM A153/A153M.

- E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

- F. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.

2.08 Fabrication

- A. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch (19 mm) beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.
- B. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
 - 1. Sidelite and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by welding.
 - 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - 3. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
 - 4. Terminated Stops (Hospital Stops): Terminate stops 6 inches (152 mm) above finish floor with a 90-degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.
- C. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping in accordance with ANSI/SDI A250.6, the Door Hardware Schedule on Drawings, and templates.
 - 1. Reinforce doors and frames to receive non-templated, mortised, and surface-mounted door hardware.
 - 2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

2.09 Steel Finishes

- A. Factory Finish: Clean, pretreat, and apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, complying with ANSI/SDI A250.3.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION**3.01 Preparation**

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.
- B. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

3.02 Installation

- A. Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.
- B. Hollow-Metal Frames: Comply with ANSI/SDI A250.11.
 - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
 - a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
 - b. Install frames with removable stops located on secure side of opening.
 - 2. Fire-Rated Openings: Install frames in accordance with NFPA 80.
 - 3. Floor Anchors: Secure with post-installed expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of post-installed expansion anchors if so indicated and approved on Shop Drawings.
 - 4. Solidly pack mineral-fiber insulation inside frames.
 - 5. Installation Tolerances: Adjust hollow-metal frames 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.
- C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.
 - 1. Non-Fire-Rated Steel Doors: Comply with SDI A250.8.

2. Fire-Rated Doors: Install doors with clearances in accordance with NFPA 80.
 3. Smoke-Control Doors: Install doors in accordance with NFPA 105.
- D. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

3.03 Field Quality Control

- A. Inspection Agency: Owner will engage a qualified inspector to perform inspections and to furnish reports to Architect.
- B. Inspections:
1. Fire-Rated Door Inspections: Inspect each fire-rated door in accordance with NFPA 80, Section 5.2.
 2. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements in accordance with NFPA 101, Section 7.2.1.15.
- C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
- E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80.

3.04 Repair

- A. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint in accordance with manufacturer's written instructions.
- B. Factory-Finish Touchup: Clean abraded areas and repair with same material used for factory finish in accordance with manufacturer's written instructions.

END OF HOLLOW METAL DOORS AND FRAMES

SECTION 21 13 13 FIRE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.02 SCOPE

- A. Design, furnish and install an automatic fire sprinkler system to protect the entire building as indicated herein and as shown on the drawings. Water supply shall conform to IFC water supply requirements. Contractor to provide water supply information as required by the local AHJ with the shop drawing submittals.
- B. This project includes adding an automatic fire sprinkler system to the building.
- C. All portions of the systems shall be installed in accordance with the drawings, details, and specifications and as required by jurisdictional authorities and codes. The position is taken that the Owner is entitled to a project which meets or exceeds the minimum requirements of nationally recognized fire protection standards. All efforts and installations shall be directed toward this end.
- D. The intent of these specifications is to describe the systems to be installed, including minor details of work or materials not specifically mentioned or shown on the drawings, but necessary for the successful operation and completion of the installation. Contractor is responsible for providing all materials and labor necessary for a complete system installation in accordance with applicable codes and these specifications. This includes any fittings, offsets, valves, hangers, bracing or piping that may be necessary due to field conditions or coordination with other trades.
- E. Work to be performed under this section shall include, but not be limited to the following:
 - 1. Wet pipe flow switch system.
 - a. Pipe and fittings.
 - b. Hangers and supports.
 - c. Valves.
 - d. Alarms.

e. Specialties.

F. Furnish and install an automatic fire protection system of type or types required in the following areas:

1. Wet Pipe System: To protect all areas of areas of the building.

1.03 RELATED SECTIONS

A. Refer to Specification 28 31 76 Conventional Fire Alarm System for related work and coordination.

1.04 RELATED WORK

A. All work performed under this section of the specifications shall be subject to the requirements of the General.

B. Examine all specification parts thoroughly before submitting a proposal for accomplishment of work in this section.

1.05 REGULATORY AGENCIES

A. Contractors and installation of all systems of fire protection shall conform to all requirements of applicable codes and publications herein defined:

1. International Building Code (2021)
2. International Fire Code (2021)
3. NFPA #13 (2019)
4. All State and local ordinances
5. Underwriters' Laboratories
6. American Society of Testing Materials
7. American National Standards Institute
8. Occupational Safety and Health Administration

1.06 SUBMITTALS

A. General

1. The successful Contractor shall provide submittal data as required under other portions of this specification. Submittals shall conform to the instructions set forth in the contract.
2. Work on the project shall not begin until submittals have been accepted and approved by the Authority Having Jurisdiction.

B. Working Plans

1. Working drawings prepared by a licensed NICET III sprinkler designer (floor plans - detailed working drawings), showing dimensions, ducts, lights, or other items affecting the fire protection systems shall be submitted to jurisdictional agencies for review and approval. All items identified in NFPA #13 for proper working drawings shall be complied with. The Engineer will reject all submittals not in compliance. Concurrently, working drawings shall be sent to the jurisdictional agencies for review. Work shall not begin until the Engineer and the jurisdictional agencies have reviewed and approved the working drawings.
2. Working drawings shall be prepared in AutoCAD or compatible software.

C. Catalog/Product Information

1. Full catalog information shall be submitted for approval for all materials intended for use on this project. Catalog information indicating more than one item shall be highlighted to clearly indicate the proposed equipment or an index shall be provided with the appropriate information for each item.

D. Hydraulic Calculations

1. Hydraulic calculations prepared by a licensed NICET III sprinkler designer shall be submitted for approval. Calculations shall be provided to substantiate the pipe sizes shown on shop drawings. Should the Engineer or AHJ question the pipe size for any area, the Contractor shall provide additional calculations to the satisfaction of the Engineer or AHJ.

E. Installer's Qualifications

1. All systems of fire protection shall be installed by a licensed (for the location of installation) Fire Protection Contractor, fully experienced in fire protection installation as required and specified herein.
2. All installers shall be competent and shall hold an endorsement by the State of Alaska. Prior to beginning work, current Contractor's and Installer's license and endorsements shall be on file with the State of Alaska.

3. Fire Protection Contractors shall submit copy of their business license and the endorsement of the installer for the project.

F. Close-Out

1. Record Drawings required per paragraph 1.06 and Operation and Maintenance Manuals required per paragraph 1.07, shall be submitted for approval at the completion of the system installation.

1.07 JOB CONDITIONS

- A. The Contractor shall investigate the structural, mechanical, electrical, and finished conditions affecting the piping, and shall arrange the equipment accordingly; furnishing required fittings, offsets and accessories. Route fire protection piping to avoid interference with duct work, drain piping and other trades. In the event it becomes necessary to make field changes in pipe locations due to building construction, the Contractor shall consult with the system designer and Engineer before making any changes. Any such changes required shall be made without added cost to the Owner.
- B. The Contractor shall determine, and be responsible for, the proper locations and type of inserts for hangers, chases, sleeves, and other openings in the construction required for fire protection work and shall obtain this information well in advance of the construction progress to avoid delay of the work.
- C. Contractor is responsible for locations of sprinklers, piping and equipment and shall be coordinated with all other trades within the building. Contractor shall review all contract documents including architectural, structural, mechanical, electrical, etc. for complete contract conditions and coordinate installation as necessary. All piping shall be concealed wherever possible. Any exposed piping shall be routed as tight to structure as possible and shall be approved by the Architect. Coordinate exposed pipe routing with the Architect to minimize aesthetic impact to the building.
- D. All fees and permits specifically required for fire protection work, not obtained by others as specified elsewhere shall be applied for and paid for by this Contractor.

1.08 RECORD DRAWINGS

- A. One approved set of working plans shall be maintained on the job at all times.
- B. One set of "As-Built" drawings shall be kept on the job at all times. "As-Built" drawings shall be kept current daily. "As-Built" drawings shall be available at all times to Engineer for review and use.

- C. One reproducible set of “As-Built” drawings shall be provided to the Engineer upon completion of the work.

1.09 OPERATION AND MAINTENANCE MANUALS

- A. Three (3) sets of operating and maintenance instructions shall be provided to the Owner upon completion. Manuals shall include, as a minimum, the following:

1. “As-Built” Drawings
2. Catalog cut sheets of all materials installed
3. Equipment maintenance manuals
4. Hydraulic Calculations
5. Acceptance Test Certificate
6. Certification of Owner Training
7. Contractor Guarantee and Warranty
8. “As-Built” AutoCAD drawing (.dwg) file or equal on CD
9. Copy of NFPA #25 (2017)

1.010 TRAINING

- A. The Fire Protection Contractor shall instruct the Owner in the operation of the system. The contractor shall conduct a training course for the responding fire department and operating and maintenance personnel. Training must be performed on two separate days (to accommodate different shifts of Fire Department personnel) for a period of 2 hours of normal working time and must start after the system is functionally complete and after the final acceptance test. Training for operating and maintenance personnel shall consist of 4 hours at the location of the project and shall be independent of fire department training. Training session for the operating and maintenance personnel must cover all of the items contained in the approved Operating and Maintenance Instructions.
- B. Contractor shall obtain the Owner or Owner’s representative dated signature that all training has been accomplished and is acceptable to the Owner. This certificate of owner training shall be provided to the Engineer for inclusion in the Operation and Maintenance manuals per Section 1.09.

1.011 GUARANTEES AND WARRANTIES

- A. The Fire Protection Contractor shall guarantee to the Owner in writing, all equipment and workmanship for a period of one (1) year after the fire protection system has been placed in continuous service and has been accepted by all authorities having jurisdiction.
- B. The Fire Protection Contractor shall not be held responsible for improper or negligent maintenance by the Owner after operating and maintenance indoctrination has been given the Owner.

PART 2 - PRODUCTS**2.01 FIRE PROTECTION SYSTEM EQUIPMENT**

- A. Where contract documents indicate specific model number or manufacturer; Contractor may substitute identical equipment approved by FM Global for fire protection use.

2.02 AUTOMATIC SPRINKLERS

- A. Install sprinklers from reviewed working drawings.
- B. All sprinklers shall be of similar design and from a single manufacturer.
- C. The operating temperature of sprinklers shall be as required by the specific location of installation.
- D. Sprinklers shall conform to the following schedule:
 - 1. All sprinklers shall be quick-response glass bulb type.
 - 2. All sprinkler heads shall be made of corrosion resistance finishes due to corrosive environment in storage area.
- E. Manufacturers
 - 1. Tyco
 - 2. Victaulic
 - 3. Viking
 - 4. Reliable

2.03 PIPE AND FITTINGS – ABOVEGROUND

- A. Piping for automatic sprinkler system shall conform to NFPA #13 and as follows.
- B. Piping with threaded fittings shall be Schedule 40 black steel pipe.
- C. Fittings for threaded and coupled pipe shall consist of cast iron, malleable iron or ductile iron threaded fittings joined with Teflon tape thread sealing compound or pipe joint compound. Pressure rating of fittings shall be as required for application.
- D. Piping with grooved fittings for sizes 2½ inch and larger shall be Schedule 10 black steel pipe with painted grooved fittings.
- E. Fittings for grooved end pipe shall consist of Central Grinnell Series or equal couplings and fittings in accordance with NFPA #13.
- F. Fittings for plain end pipe shall not be used.
- G. All drain and fire department connection piping and fittings down-stream of valves shall be galvanized. Painted grooved fittings are acceptable.
- H. Pipe to be painted due to corrosive environment in storage area. Coordinate color with Architect.

2.04 HANGERS AND SUPPORTS

- A. Space pipe hangers in accordance with the requirements of NFPA #13. Construct hangers, hanger rods, inserts and clamps as approved by the same manufacturer.
- B. Manufacturers:
 - 1. Tolco (Cooper B-Line)
 - 2. Afcon
 - 3. Erico
 - 4. Speedy Product (Super Screws)
 - 5. Allied

2.05 SEISMIC PROTECTION

- A. Furnish and install all earthquake bracing and restraint on all piping as required by International Building Code, NFPA #13 and the authority having jurisdiction.
- B. Bracing attachments shall be made to the top chord of open web steel bar joists or wood trusses.
- C. Provide necessary flexible couplings, seismic separation assemblies and required clearances around pipe penetrations as indicated in NFPA #13 section 9.3.

2.06 VALVES

- A. Gate or butterfly valves shall be approved indicating type as required by NFPA #13. Test and drain valves shall be approved brass globe, angle, or ball valves. Locate sprinkler system isolation valves as shown on the drawings complete with a tamper alarm switch.
- B. Manufacturers:
 - 1. Nibco
 - 2. Victaulic
 - 3. Tyco
 - 4. Reliable
 - 5. United Brass
 - 6. AGF Manufacturing

2.07 SPECIALTIES

A. Escutcheon Plates

- 1. Where exposed piping passes through finished work, chrome plated or other finish acceptable to the Engineer, wall plates shall be installed. Split wall plates or escutcheons shall be installed to fit snugly around piping. All wall plates shall be metal.
- 2. Solid galvanized wall plates shall be used at both sides of all exterior walls.

B. Valve Identification

1. All valves within the building shall have permanently marked identification signs provided in accordance with NFPA #13 standards. Signs shall be manufactured and not handwritten. Signs shall be hung with galvanized or chrome chain.

C. Spare Head Supply

1. Furnish and install a supply of extra sprinklers of each type and degree link installed in the project, complete with mountable box. Mount box on wall next to sprinkler entry. Provide wrenches for each type of sprinkler installed in box.

2.08 ELECTRICAL DEVICES

- A. All electrical devices shall be coordinated with Electrical and Fire Alarm System specification requirements for compatibility of voltages and manufacturer.

B. Manufacturers:

1. Potter Signal Co.
2. System Sensor

PART 3 - EXECUTION

3.01 DESIGN CRITERIA

- A. The entire sprinkler system is not shown on plans. Plans indicate general hazard classification only. The intent is for the fire protection system contractor to provide a complete sprinkler system as required. The fire protection system contractor shall be responsible for surveying the site, new construction, and prepare working drawings for the total system.
- B. The fire protection system contractor shall design the piping to supply the system. Piping shall be laid out so as not to interfere with the installation of other piping, ductwork or light fixtures and generally routed as indicated on the drawings.
- C. Where piping is exposed, special notation on Contractor's drawings to that effect will be evident and conspicuous on the drawings. Any piping determined to be a problem shall be relocated at no cost to the Owner.
- D. System piping to be hydraulically calculated by the designer in accordance with NFPA #13 to the point of connection verified for flow characteristics.
- E. Storage rooms, mechanical rooms and electrical rooms shall be designed for Ordinary Hazard, Group 2 in accordance with NFPA #13.

- F. The preparation of all working drawings and hydraulic calculations shall be accomplished and signed by a NICET Level III or higher fire sprinkler design technician or stamped and signed by a Registered Professional Engineer, competent in fire protection.

3.02 INSTALLATION

- A. Where details of installation are not given, the installation shall be made using manufacturer's recommended practices or at the direction of the Engineer.
- B. Contractor shall complete the fire protection systems ready for operation, in all respects, as soon as possible. When system is complete and ready for continuous operation, activate the system for its intended use. After system has been activated for continuous use, water charges will be paid by the Owner.
- C. This Contractor shall remove from the building, all rubbish and unused materials due to or connected with this installation. Resulting from their work.
- D. The surface of all piping shall be cleaned and left ready for painting. This includes removal of any tags or stickers on the piping.

3.03 TESTING

- A. All testing shall be accomplished in accordance with NFPA standards and requirements.
- B. This Contractor shall call for inspection and complete Contractor's Material and Test Certificates signed by the authority having jurisdiction.
- C. The sprinkler system shall be hydrostatically tested at not less than 200 psig pressure for a period of not less than two (2) hours or 50 psi above static pressure in excess of 150 psi for two (2) hours with no pressure drop in the system.
- D. All testing shall be witnessed by a representative of the Engineer or Owner and authority having jurisdiction.
- E. Where jurisdictional authority's standards are more stringent than the above test, they shall prevail.
- F. Furnish copies of Aboveground Test Certificate with close-out documentation.

END OF FIRE SPRINKLER SYSTEM

SECTION 22 05 00 COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.01 Summary

- A. Section Includes:
 - 1. Sleeves.
 - 2. Mechanical sleeve seals.
 - 3. Formed steel channel

1.02 Submittals

- A. Shop Drawings: Submit for piping and equipment identification list of wording, symbols, letter size, and color coding for pipe identification and valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- B. Product Data for Pipe and Equipment Identification: Submit for mechanical identification manufacturers catalog literature for each product required.

1.03 Water Quality Maintenance

- A. Provide plumbing fixture fittings in accordance with ASME A112.18.1 that prevent backflow from fixture into water distribution system.
- B. All piping, equipment, and components in contact with potable water, including, but not limited to, tanks, pumps, piping, valves, fittings and instrumentation, shall be ANSI/NSF-61 approved unless otherwise approved by ADEC. Materials in direct contact with drinking water shall be lead free in accordance with the "Reduction of Lead in Drinking Water Act":
 - 1. Not containing more than 0.2 percent lead when used with respect to solder and flux; and
 - 2. Not more than a weighted average of 0.25 percent lead when used with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings and fixtures.

1.04 Quality Assurance

- A. Perform Work in accordance with the 2018 UPC and State of Alaska Amendments.
- B. Maintain one copy of each document on site.

PART 2 - PRODUCTS

1.01 Sleeves

- A. Sleeves for Pipes Through Non-fire Rated Floors: 18 gage thick galvanized steel.

B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Stainless steel pipe.

C. Sealant: Acrylic

1.02 Mechanical Sleeve Seals

A. Manufacturers:

1. GPT, Link-Seal.
2. Substitutions: Permitted.

B. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

1.03 Formed Steel Channel

A. Manufacturers:

1. Cooper B-Line
2. Unistrut
3. Substitutions: Permitted.

B. Product Description: Galvanized 12 gage thick steel. With holes 1-1/2 inches on center.

1.04 Firestopping

A. Firestopping Materials: Acrylic based flexible firestop sealant, UL listed and FM approved.

PART 3 - EXECUTION

1.01 Examination

A. Verify openings are ready to receive sleeves.

1.02 Installation - Sleeves

- A. Exterior watertight entries: Seal with mechanical sleeve seals.
- B. Set sleeves in position in forms. Provide reinforcing around sleeves.
- C. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- D. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.
- E. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with firestopping insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- F. Install stainless steel escutcheons at finished surfaces.

1.03 Installation - Firestopping

- A. Firestopping Materials: Use UL or FM approved flexible firestop sealant, installed per manufacturer's instructions.

END OF COMMON WORK RESULTS FOR PLUMBING

SECTION 22 05 29

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 Summary

A. Section Includes:

1. Pipe hangers and supports.
2. Hanger rods.
3. Flashing.
4. Firestopping
5. Equipment Bases and Supports:

1.02 Submittals

A. Shop Drawings: Indicate system layout with location including critical dimensions, sizes, pipe hanger and support locations, and detail of trapeze hangers.

B. Product Data:

1. Hangers and Supports: Manufacturers catalog data including load capacity.

C. Design Data: Indicate load-carrying capacity of trapeze, multiple pipe, and riser support hangers. Indicate calculations used to determine load carrying capacity of trapeze, multiple pipe, and riser support hangers.

D. Manufacturer's Installation Instructions:

1. Hangers and Supports: Submit special procedures and assembly of components.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.03 Quality Assurance

A. Fire-Resistant Joints in Fire-Rated Floor, Roof, and Wall Assemblies: UL 2079 to achieve fire resistant rating as indicated on Drawings for assembly in which joint is installed.

B. Fire-Resistant Joints Between Floor Slabs and Exterior Walls: ASTM E119 with 0.10 inch water gage minimum positive pressure differential to achieve fire resistant rating as indicated on Drawings for floor assembly.

C. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested according to ASTM E84.

D. Perform Work according to AWS D1.1 for welding hanger and support attachments to building structure.

E. Passivate stainless steel welds per ASTM A967. Confirm absence of free iron in heat affected zone using ASTM A967, Copper Sulfate Test, Practice C.

F. Manufacturer: Company specializing in manufacturing products specified in this Section with three years' experience.

G. Installer: Company specializing in performing Work of this Section with three years' experience.

1.04 Field Measurements

A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

1.01 Pipe Hangars And Supports

A. Manufacturers:

1. Carpenter & Paterson, Inc.
2. ERICO International Corporation
3. Unitron Product, Inc. / US-Strut
4. Substitutions Permitted

B. Plumbing Piping – DWV & Facility Storm Drainage:

1. Hangars shall be hot-dipped galvanized or stainless steel.
2. Conform to MSS SP69.
3. Hangars for Pipe Sizes 1/2 to 1-1/2 inch: Steel, adjustable swivel, split ring.
4. Hangars for Pipe Sizes 2 inches and Larger: Steel, adjustable clevis.
5. Multiple or Trapeze Hangars: Steel channels with welded spacers and hanger rods.
6. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hook.
7. Wall Support for Pipe Sizes 4 inches and Larger: Welded steel bracket and wrought steel clamp.
8. Vertical Support: Steel riser clamp.
9. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
10. Copper Pipe Support: Vinyl coated, steel adjustable ring.

C. Plumbing Piping - Water:

1. Hangars shall be hot-dipped galvanized or stainless steel.
2. Conform to MSS SP69.
3. Hangars for Pipe Sizes 1/2 to 1-1/2 inch: Steel, adjustable swivel, split ring.
4. Hangars for Cold Pipe Sizes 2 inches and Larger: Steel, adjustable clevis.
5. Hangars for Hot Pipe Sizes 2 to 4 inches: Steel, adjustable clevis.

6. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
7. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hook.
8. Wall Support for Pipe Sizes 4 inches and Larger: Welded steel bracket and wrought steel clamp.
9. Wall Support for Hot Pipe Sizes 6 inches and Larger: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
10. Vertical Support: Steel riser clamp.
11. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
12. Floor Support for Hot Pipe Sizes 4 inches and Smaller: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
13. Floor Support for Hot Pipe Sizes 6 inches and Larger: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
14. Copper Pipe Support: Vinyl coated, Steel ring.

1.02 Accessories

- A. Hanger Rods: Stainless steel threaded both ends, threaded on one end, or continuous threaded.

1.03 Flashing

- A. Metal Flashing: 26 gage stainless steel.
- B. Metal Counterflashing: 22 gage stainless steel.
- C. Lead Flashing:
 1. Waterproofing: 5 lb./sq. ft sheet lead.
 2. Soundproofing: 1 lb./sq. ft sheet lead.
- D. Flexible Flashing: 47 mil thickness sheet butyl; compatible with roofing.
- E. Caps: Stainless steel, 22 gage minimum; 16 gage at fire resistant elements.

1.04 Firestopping

- A. Firestopping Materials: Acrylic based flexible firestop sealant, UL listed and FM approved.

PART 3 - EXECUTION

1.01 Preparation

- A. Obtain permission from Architect/Engineer before using powder-actuated anchors.
- B. Do not drill or cut structural members.

1.02 Installation

- A. Pipe Hangers and Supports: According to MSS SP 69.
- B. Support horizontal piping as scheduled.
- C. Install hangers with minimum 1/2 inch space between finished covering and adjacent work.
- D. Place hangers within 12 inches of each horizontal elbow.
- E. Use hangers with 1-1/2 inch minimum vertical adjustment.
- F. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.
- G. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.
- H. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.
- I. Support riser piping independently of connected horizontal piping.
- J. Provide vinyl coated hangers and supports in contact with copper piping.
- K. Design hangers for pipe movement without disengagement of supported pipe.
- L. Provide clearance in hangers and from structure and other equipment for installation of insulation. Refer to Section 22 07 00.
- M. Equipment Bases and Supports:
 - 1. Provide housekeeping pads of concrete, minimum 3-1/2 inches thick and extending 6 inches beyond supported equipment. Refer to Section 03 30 00.
 - 2. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.
 - 3. Construct supports of steel members or formed steel channel. Brace and fasten with flanges bolted to structure.
 - 4. Provide rigid anchors for pipes after vibration isolation components are installed.
- N. Flashing:
 - 1. Provide flexible flashing and metal counterflashing where piping penetrates weather or waterproofed walls, floors, and roofs.
 - 2. Flash vent and soil pipes projecting 3 inches minimum above finished roof surface with lead worked 1 inch minimum into hub, 8 inches minimum clear on sides with 24 x 24 inches sheet size. For pipes through outside walls, turn flanges back into wall and caulk, metal counter-flash, and seal.
 - 3. Flash floor drains in floors with topping over finished areas with lead, 10 inches clear on sides with minimum 36 x 36 inch sheet size. Fasten flashing to drain clamp device.

4. Seal floor, shower, and mop sink drains watertight to adjacent materials.

O. Firestopping:

1. Firestopping Materials installation: Install per manufacturer's instructions.

1.03 Schedules

PIPE HANGER SPACING		
PIPE MATERIAL	MAXIMUM HANGER SPACING Feet	HANGER ROD DIAMETER Inches
ABS (All sizes)	4	3/8
Cast Iron (All Sizes)	5	5/8
Cast Iron (All Sizes) with 10 foot length of pipe	10	5/8
CPVC, 1 inch and smaller	3	1/2
CPVC, 1-1/4 inches and larger	4	1/2
Copper Tube, 1-1/4 inches and smaller	6	1/2
Copper Tube, 1-1/2 inches and larger	10	1/2
PP-R, 2 inches and smaller	4	3/8
PP-R, 2-1/2 inches to 4 inches	5	1/2
PP-R, 4 inches and larger	6	1/2
PVC (All Sizes)	4	3/8
Steel, 3 inches and smaller	12	1/2
Steel, 4 inches and larger	12	5/8
Stainless Steel Tubing	4	3/8

END OF HANGERS AND SUPPORTS FOR PLUMBING

SECTION 22 11 00 FACILITY WATER DISTRIBUTION

PART 1 -- GENERAL

1.01 Summary

A. Section Includes:

1. Domestic water piping, above grade.
2. Unions and flanges.
3. Valves.
4. Pipe hangers and supports.
5. Pressure gages.
6. Pressure gage taps.
7. Thermometers.
8. Relief valves.
9. Strainers.
10. Hose bibs.
11. Backflow preventers.
12. Thermostatic Mixing Valves

1.02 Reference Documents

- A. ASTM F2389-07 - Standard Specification for Pressure-rated Polypropylene (PP) Piping Systems
- B. CSA B137.11 - Polypropylene (PP-R) Pipe and Fittings for Pressure Applications
- C. NSF/ANSI 14 – Plastic Piping System Components and Related Materials

1.03 Submittals

A. Product Data:

1. Piping: Materials, fittings, and accessories. Manufacturer's catalog information.
2. Valves: Manufacturers catalog information with valve data and ratings for each service.
3. Domestic Water Specialties: Manufacturers catalog information, component sizes, rough-in requirements, service sizes, and finishes.
4. Pumps: Type, capacity, certified pump curves showing pump performance characteristics with pump and system operating point plotted. NPSH curve. Electrical characteristics and connection requirements.

B. Manufacturer's Installation Instructions: Pumps, valves, and accessories.

C. Manufacturer's Certificate: Products meet or exceed specified requirements.

1.04 Warranty

- A. Manufacturer shall warrant PP-R pipe and fittings for 10 years to be free of defects in materials or manufacturing.
 - 1. Warranty shall cover labor and material costs of repairing and/or replacing defective materials and repairing any incidental damage caused by failure of the piping system due to defects in materials or manufacturing.
 - 2. Warranty shall be in effect only upon submission by the contractor to the manufacturer valid pressure/leak test documentation indicating that the system was tested and passed the manufacturer's pressure/leak test.

1.05 Water Quality Maintenance

- A. All piping, equipment, and components in contact with potable water, including, but not limited to, tanks, pumps, piping, valves, fittings and instrumentation, shall be ANSI/NSF-61 approved unless otherwise approved by ADEC. Materials in direct contact with drinking water shall be lead free in accordance with the "Reduction of Lead in Drinking Water Act":
 - 1. Not containing more than 0.2 percent lead when used with respect to solder and flux; and
 - 2. Not more than a weighted average of 0.25 percent lead when used with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings and fixtures.

1.06 Quality Assurance

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with three years' experience.
- B. Installer: Company specializing in performing Work of this Section with three years' experience.

PART 2 -- PRODUCTS

2.01 Domestic Water Piping, Above Grade – Mechanical Room

- A. Copper Tubing: ASTM B88, Type L drawn.
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - 2. Joints: ASTM B32, Alloy Grade Sb5 tin-antimony, or Alloy Grade Sn95 tin-silver, lead free solder
- B. PEX: ASTM F876, ASTM F877, AWWA C904-06, Crosslinked polyethylene tubing, rated for 100 PSI @ 180°F.
 - 1. Fittings and Joints: Compression sleeve fittings, ASTM f2080, NSF/ANSI 14, NSF/ANSI 61.

2.02 Domestic Water Piping, Above Grade – Warehouse

- A. PEX: ASTM F876, ASTM F877, AWWA C904-06, Crosslinked polyethylene tubing, rated for 100 PSI @ 180°F.

1. Fittings and Joints: Compression sleeve fittings, ASTM F2080, NSF/ANSI 14, NSF/ANSI 61.
 - B. PP-R: ASTM F2389, NSF/ANSI 61, NSF/ANSI 14., SDR 11. Rated for 140 PSI @ 120°F.
 1. Fittings and Joints: Socket weld fittings, Butt weld fittings, butt weld joints, socket couplings, NSF/ANSI 61, NSF/ANSI 14.
- 2.03 Unions And Flanges
- A. Unions for Pipe 2 inches and Smaller:
 1. Ferrous Piping: Class 150, malleable iron, threaded.
 2. Copper Piping: Class 150, bronze unions with soldered joints.
 3. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.
 - B. Flanges for Pipe 2-1/2 inches and Larger:
 1. Ferrous Piping: Class 150, forged steel, slip-on flanges.
 2. Copper Piping: Class 150, slip-on bronze flanges.
 3. Gaskets: 1/16 inch thick preformed neoprene gaskets.
- 2.04 Gate Valves
- A. 2 inches and Smaller: MSS SP 80, class 125, bronze body, bronze trim, threaded bonnet, non-rising stem, hand wheel, inside screw with back-seating stem, solid wedge disc, solder or threaded ends.
 - B. 2-1/2 inches and Larger: MSS SP 70, class 125, cast iron body, bronze trim, bolted bonnet, non-rising stem, hand-wheel, outside screw and yoke, solid wedge disc with bronze seat rings, flanged ends. Furnish chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.
- 2.05 Globe Valves
- A. 2 inches and Smaller: MSS SP 80, class 125, bronze body, bronze trim, threaded bonnet, hand wheel, Buna-N composition disc, solder or threaded ends.
 - B. 2-1/2 inches and Larger: MSS SP 85, class 125, cast iron body, bronze trim, hand wheel, outside screw and yoke, flanged ends. Furnish chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.
- 2.06 Ball Valves
- A. 2 inches and Smaller: MSS SP 110, class 150, bronze, two-piece body, chrome plated bronze ball, full port, teflon seats, blow-out proof stem, solder ends with union, or threaded ends, lever handle.
- 2.07 Check Valves
- A. Horizontal Swing Check Valves:
 1. 2 inches and Smaller: MSS SP 80, class 150, bronze body and cap, bronze seat, Buna-N disc, solder ends.

2. 2-1/2 inches and Larger: MSS SP 71, class 125, cast iron body, bolted cap, bronze or cast iron disc, renewable disc seal and seat, flanged ends.

B. Spring-Loaded Check Valves:

1. 2 inches and Smaller: MSS SP 80, class 150 bronze body, in-line spring lift check, silent closing, Buna-N disc, integral seat, solder ends.
2. 2-1/2 inches and Larger: MSS SP 71, class 125, wafer style, cast iron body, bronze seat, center guided bronze disc, stainless steel spring and screws, flanged ends.

2.08 Pipe Hangars And Supports

- A. Refer to Section 22 05 29.

2.09 Pressure Gages

- A. Gage: ASME B40.1, UL 393 with bourdon tube, rotary brass movement, brass socket, front calibration adjustment, black scale on white background.
1. Case: Stainless steel.
 2. Bourdon Tube: Brass.
 3. Dial Size: 2 inch diameter.
 4. Mid-Scale Accuracy: 1 percent.
 5. Scale: Psi.

2.010 Pressure Gage Taps

- A. Ball Valve: Brass for 250 psi.
- B. Pulsation Damper: Pressure snubber, brass with 1/4 inch NPT connections.

2.011 Stem Type Thermometers

- A. Thermometer: Adjustable angle, digital display, light powered, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device.
1. Size: 7-inch case.
 2. Power source: Photovoltaic cells requiring 10 lux of illumination for operation.
 3. Display: 9/16 inch LCD, 4 digits, 1/10 degree resolution, switchable between F and C, updated every 10 seconds.
 4. Stem: Aluminum, 3/4 inch NPT, 3-1/2 inch long, with glass passivated thermistor.
 5. Range: Minus 40 to 300 degrees F (minus 40 to 150 degrees C)
 6. Accuracy: 1 percent or 1 degree F, whichever is greater

2.012 Relief Valves

- A. Pressure Relief:
1. Bronze body, Teflon seat, steel stem and springs, automatic, direct pressure actuated at maximum 60 psi, UL listed for fuel oil, capacities ASME certified and labeled.

B. Temperature and Pressure Relief:

1. ANSI Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME certified and labeled.

2.013 Strainers

- A. 2 inch and Smaller: Threaded brass body for 175 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
- B. 1-1/2 inch to 4 inch: Class 125, flanged iron body, Y pattern with 1/16-inch stainless steel perforated screen.
- C. 5 inch and Larger: Class 125, flanged iron body, basket pattern with 1/8 inch stainless steel perforated screen.

2.014 Hose Bibs

- A. Interior: Bronze or brass with integral mounting flange, replaceable hexagonal disc, hose thread spout, with hand wheel, integral vacuum breaker in conformance with ASSE 1011.

2.015 Backflow Preventers

- A. Reduced Pressure Principle Backflow Preventer:
 1. Comply with ASSE 1013, NSF/ANSI 61.
 2. Bronze body, with bronze internal parts and stainless steel springs.
 3. Two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve opening under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

2.016 Thermostatic Mixing Valves

- A. Anti-Scalding Mixing Valve
 1. Comply with ASSE 1071, NSF/ANSI 61
 2. Lead free brass body, with integral check valves to prevent cross contamination.

PART 3 -- EXECUTION**3.01 Preparation**

- A. Ream pipe and tube ends. Remove burrs.

3.02 General

- A. Where more than one piping system material is specified, provide compatible system components and joints. Use non-conducting dielectric connections whenever jointing dissimilar metals in open systems.
- B. Provide flanges, union, and couplings at locations requiring servicing. Use unions, flanges, and couplings downstream of valves and at equipment or apparatus connections. Do not use direct welded or threaded connections to valves, equipment or other apparatus.

- C. Use gate, ball, or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- D. Use globe valves for throttling, bypass, or manual flow control services.
- E. Use spring loaded check valves on discharge of hot water pumps.
- F. Use butterfly valves in heating water systems interchangeably with gate and globe valves.
- G. Use lug end butterfly valves to isolate equipment.
- H. Use 3/4 inch ball valves with hose end adapter and cap for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment.
- I. Flexible Connectors: Use at or near pumps where piping configuration does not absorb vibration.

3.03 Installation

A. Thermometers and Gages:

1. Install one pressure gage for each pump, locate taps before strainers and on suction and discharge of pump; pipe to gage.
2. Install gage taps in piping.
3. Install pressure gages with pulsation dampers. Provide valve to isolate each gage.
4. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inches for installation of thermometer sockets. Allow clearance from insulation.
5. Provide instruments with scale ranges selected according to service with largest appropriate scale.
6. Install gages and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
7. Adjust gages and thermometers to final angle, clean windows and lenses, and calibrate to zero.

B. Hangers and Supports:

1. Install hangers and supports according to Section 22 05 29.

C. Aboveground Piping:

1. Install non-conducting dielectric connections wherever jointing dissimilar metals.
2. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
3. Group piping whenever practical at common elevations.
4. Slope piping and arrange systems to drain at low points.
5. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 22 05 29.
6. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 22 07 00.

7. Provide access where valves and fittings are not accessible.
8. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welding.
9. Provide support for utility meters according to requirements of utility companies.
10. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting. Refer to Section 09 97 00.
11. Install domestic and utility water piping according to ASME B31.9.
12. Sleeve pipes passing through partitions, walls and floors. Refer to Section 22 05 00.
13. Install firestopping at fire rated construction perimeters and openings containing penetrating sleeves and piping. Use UL or FM approved flexible firestop sealant, installed per manufacturer's instructions.
14. Install unions downstream of valves and at equipment or apparatus connections.
15. Install valves with stems upright or horizontal, not inverted.
16. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
17. Install gate or ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
18. Install globe valves for throttling, bypass, or manual flow control services.
19. Provide lug end butterfly valves adjacent to equipment when functioning to isolate equipment.
20. Provide spring-loaded check valves on discharge of water pumps.
21. Provide flow controls in water circulating systems as indicated on drawings.
22. Install potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibs.
23. Pipe relief from valves, back-flow preventers and drains to nearest floor drain.
24. Test backflow preventers according to ASSE 5013.
25. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to washing machine outlets.
26. Install air chambers on hot and cold water supply piping to each fixture or group of fixtures (each washroom). Fabricate same size as supply pipe or 3/4 inch minimum, and minimum 18 inches long.

3.04 Field Quality Control

- A. Test domestic water piping system according to applicable code

3.05 Cleaning

- A. Flush system to remove traces of flux or other materials.

3.06 Disinfection Of Domestic Water System

- A. Prior to starting work, verify system is complete, flushed and clean.
- B. Verify pH of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- C. Inject disinfectant, free chlorine in liquid, powder and tablet or gas form, throughout system to obtain residual from 50 to 80 mg/L.
- D. Bleed water from outlets to obtain distribution and test for disinfectant residual at minimum 15 percent of outlets.
- E. Maintain disinfectant in system for 24 hours.
- F. When final disinfectant residual tests less than 25 mg/L, repeat treatment.
- G. Flush disinfectant from system until residual concentration is equal to incoming water or 1.0 mg/L. Neutralize disinfectant and dispose of disinfecting water in accordance with ADEC regulations.
- H. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze according to AWWA C651.

END OF FACILITY WATER DISTRIBUTION

SECTION 22 13 00 FACILITY SANITARY SEWERAGE

PART 1 - GENERAL

1.01 Summary

A. Section Includes:

1. Sanitary sewer piping buried within 5 feet of building.
2. Sanitary sewer piping above grade.
3. Unions and flanges.
4. Valves.
5. Pipe hangers and supports.
6. Floor drains.
7. Cleanouts.
8. Bedding and cover materials.

1.02 Submittals

A. Product Data:

1. Piping: Pipe materials, fittings, and accessories. Submit manufacturers catalog information.
2. Valves: Manufacturers catalog information with valve data and ratings for each service.
3. Hangers and Supports: Manufacturers catalog information including load capacity.
4. Sanitary Drainage Specialties: Manufacturers catalog information, component sizes, rough-in requirements, service sizes, and finishes.
5. Pumps: Pump type, capacity, certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve. Include electrical characteristics and connection requirements.

B. Manufacturer's Installation Instructions: Material and equipment.

C. Manufacturer's Certificate: Products meet or exceed specified requirements.

1.03 Quality Assurance

A. Manufacturer: Company specializing in manufacturing products specified in this Section with three years' experience.

B. Installer: Company specializing in performing Work of this Section with three years' experience.

1.04 Field Measurements

- A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.01 Sanitary Sewer Piping, Above Grade

- A. PVC Pipe: ASTM D1784, ASTM D1785.

- 1. Fittings: PVC, ASTM D2466
- 2. Joints: ASTM D2672, solvent weld socket.

- B. ABS Pipe: ASTM D2661 or ASTM F628, cellular core

- 1. Fittings: ABS, ASTM D2661.
- 2. Joints: ASTM D2235, solvent weld.

2.02 Unions And Flanges

- A. Unions for Pipe 2 inches and Smaller:

- 1. Copper Piping: Class 150, bronze unions with soldered joints.
- 2. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.
- 3. PVC Piping: PVC.

- B. Flanges for Pipe 2-1/2 inches and Larger:

- 1. Copper Piping: Class 150, slip-on bronze flanges.
- 2. PVC Piping: PVC flanges.
- 3. HDPE Piping: 150# HDPE Flanges
- 4. Gaskets: 1/16 inch thick preformed neoprene gaskets.

- C. PVC Pipe Materials: For connections to equipment and valves with threaded connections, furnish solvent-weld socket to MNPT screwed joint adapters and unions, or ASTM D2464, Schedule 80, threaded, PVC pipe.

2.03 Pipe Hangars And Supports

- A. Refer to Section 22 05 29.

PART 3 - EXECUTION

3.01 Examination

- A. Verify excavations are to required grade, dry, and not over-excavated.

3.02 Preparation

- A. Ream pipe and tube ends. Remove burrs.
- B. Prepare piping connections to equipment with flanges or unions.

- C. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

3.03 Installation

A. Aboveground Piping:

1. Establish invert elevations, slopes for drainage to 1/4 inch per foot minimum. Maintain gradients.
2. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Provide clearances at cleanout for snaking drainage system.
3. Encase exterior cleanouts in concrete flush with grade.
4. Install floor cleanouts at elevation to accommodate finished floor.
5. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
6. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
7. Install piping to maintain headroom. Do not spread piping, conserve space.
8. Group piping whenever practical at common elevations.
9. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 22 05 00.
10. Provide clearance in hangers and from structure and other equipment for installation of insulation. Refer to Section 22 07 00.
11. Provide access where valves and fittings are not accessible.
12. Install piping penetrating roofed areas to maintain integrity of roof assembly.
13. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
14. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting. Refer to Section 09 97 00.
15. Install bell and spigot pipe with bell end upstream.
16. Sleeve pipes passing through partitions, walls and floors.
17. Install firestopping at fire rated construction perimeters and openings containing penetrating sleeves and piping. Use UL or FM approved flexible firestop sealant, installed per manufacturer's instructions.
18. Support cast iron drainage piping at every joint.

3.04 Field Quality Control

- A. Test sanitary waste and vent piping system according to Uniform Plumbing Code.

END OF FACILITY SANITARY SEWERAGE

SECTION 23 05 00 COMMON WORK RESULTS FOR MECHANICAL

PART 1 - GENERAL

1.01 Extent Of Coverage

- A. The requirements of this Section apply to all Division 22, 23 and referenced Sections from Division 43 including, but not limited to the following systems:
 - 1. Water utility transmission systems.
 - 2. Sanitary sewerage utility transmission systems.
 - 3. Heating utility transmission systems.
 - 4. Plumbing systems.
 - 5. Heating systems.
 - 6. Ventilation systems.
 - 7. Fuel systems.
 - 8. Controls systems.
- B. All requirements of Division 0 and 1 apply to these Specifications.

1.02 Work Included

- A. Furnish all labor, materials, equipment, supervision of labor and performance of all operations required to completely install code compliant and satisfactorily operating mechanical and plumbing systems as defined herein and on Plans.
- B. The intent of the Specifications and accompanying Plans is to provide a complete and operational facility with complete systems as shown, specified and required by applicable codes. Include all work specified in the Specifications and shown on the accompanying Plans including controls, fasteners, appurtenances, connections, etc., in the finished job.
- C. The Specifications and the accompanying Plans are complementary, and what is called for by one shall be as binding as if called for by both. Items shown on the Plans are not necessarily included in the Specifications and vice versa.
- D. Imperative language is frequently used in the Specifications. Except as otherwise specified, requirements expressed imperatively are to be performed by the Contractor.
- E. The Plans are diagrammatic and schematic in nature.
 - 1. The Plans do not show every offset, bend, tee, or elbow which may be required to install work in the space provided and avoid conflicts. Follow the Drawing as closely as is practical to do so and install additional offsets, bends, tees, and elbows where required by local conditions and measurements taken at the Building, subject to approval, and without additional cost to the Owner.

2. The plans do not show all taps, fittings, valves, and dampers required to integrate in a fully functional controls and process systems. Coordinate all work with the controls system and Sequence of Operation as well as process documents and Functional Narrative.
 3. Do not scale the mechanical drawings. Locations of equipment are approximate unless specifically dimensioned on the Plans. Equipment and fixtures shall be located to maintain code compliance and manufacturer's recommended installation clearances.
 4. The right is reserved to make any reasonable changes in outlet location prior to roughing-in.
- F. Notify Owner's Representative in writing immediately of any identified conditions that will impact the timely and successful installation of the systems in accordance with the Plans and Specifications.

1.03 Definitions:

- A. Definitions provided within this Section shall be superseded by definitions provided in Division 1.
- B. "Provide": Includes the furnishing and installation of all materials, equipment, products, labor, subcontracts, appurtenances, mark-ups, taxes, permits, and any other item which may be required to provide complete operable systems.
- C. "Furnish": Purchase and deliver to the job site, materials or labor as shown on the Plans or specified herein.
- D. "Install": The installation, setting in place, connection to, bolting down, supporting or any operation to make complete and operable.
- E. "Rough In / Connect Only": This means to provide an appropriate system connection such as supplies with stops, continuous wastes with traps, shut-off valves required, and all piping connections, testing, etc.
- F. "Accessible": Means arranged so that an appropriately dressed man 6'2" tall weighing 250 pounds, may approach the area in question with tools and products necessary for the work intended, and may then position himself to properly perform the task to be accomplished, without disassembly or damage to the surrounding installation.
- G. "Serviceable": means arranged so that the component or product in question may be properly removed, and replaced without disassembly, destruction, or damage to the surrounding installation or piece being serviced.
- H. "Streamlining" In many instances, the products, reference standards, and other itemized specifications have been listed without verbiage. In these cases, it is implied that the Contractor shall provide the products and perform according to the references listed.

- I. “Demolish”: Means the removal of equipment and materials from the project including disposal off-site in compliance with applicable ADEC and other regulations.

1.04 Quality Assurance

A. Regulatory Requirements:

- 1. General: All work and materials shall conform to all local, State, and Federal codes, utility installation requirements, and other applicable laws and regulations. Verify with local Authority Having Jurisdiction for amendments.
- 2. All equipment furnished utilizing electrical or electronic products, shall be certified as complying with the most recent list of accredited electrical testing laboratories approved by the State of Alaska. Equipment not complying shall be replaced with certified equipment at no additional labor or materials cost to the Owner.

B. Permits:

- 1. Contractor shall obtain all required life/safety permits from the Authority Having Jurisdiction which may be State, Borough, and/or local entity.
- 2. All water and wastewater utility services shall be installed, sterilized, and tested in compliance with Alaska Department of Environmental Conservation regulations.
- 3. Contractor shall obtain all utility permits. Systems are to be installed in compliance with utility installation guidelines.
 - a. Contractor shall obtain and install all meters as required by the local utility.
- 4. Unless noted under Division 0 and 1, Contractor shall pay for all permits.

C. Materials and equipment shall be new. Work shall be of good quality, free of faults and defects and in conformance with the Contract Documents.

D. Apparatus shall be built and installed to deliver its full rated capacity at the efficiency for which it was designed.

E. The entire plumbing and mechanical system apparatus shall operate at full capacity without objectionable noise.

F. Materials and Equipment:

- 1. Each piece of equipment furnished shall meet all detailed requirements of the Plans and Specifications and shall be suitable for the installation shown. Notify the Engineer of any shortcomings found during the bid period. Equipment not meeting all requirements will not be acceptable, even though specified by name along with other manufacturers.

2. Where two or more units of the same class of equipment are furnished, use products of the same manufacturer; component parts of the entire system need not be products of the same manufacturer.
3. Provide all materials and equipment, new and free from defects and of the size, make, type and quality herein specified.

G. Substitutions:

1. Substitutions in materials and equipment shall follow the requirements of Division 1.
2. The Contractor shall ensure that all substitutions have equal or better performance and will fit within the available space. The Contractor shall bear the full costs associated with a substitution including the costs of other trades, additional equipment and materials required for an acceptable installation, as well as any project delays that the substitution may generate.

H. Workmanship:

1. General: All materials shall be installed in a neat and workmanlike manner.
2. Only craftsman skilled in their trade shall be employed.
3. Manufacturer's Instructions: Follow manufacturer's recommendations where they cover points not specifically indicated. If they are in conflict with the Plans and Specifications, obtain clarification from the Owner's Representative before starting work.

I. Cutting and Patching:

1. Cutting, patching, and repairing for the proper installation and completion of the work specified in this Division, including plastering, masonry work, concrete work, carpentry work, and painting, shall be performed by skilled craftsmen of each respective trade in conformance with the appropriate Division of Work.
2. Fill holes which are cut oversize so that a tight fit is obtained around the objects passing through.

1.05 Coordination:

- A. Coordinate work with all trades to avoid conflicts, errors or delays.
- B. Coordinate all wall and floor penetrations/openings, supports, and component interfaces with the module fabrication team.
 1. Module fabrication is not to proceed until details and shop drawings showing these points of collaboration have been submitted and reviewed by the design team.
- C. Coordinate the location and access for all operable and maintainable items.

- D. The work is inclusive of all Specifications and Plans. Fully review all contract documents and provide all plumbing and mechanical related work noted in all parts of the documents.

1.06 Scheduling

- A. Contractor shall schedule all work, including but not limited to the ordering of materials, demolition, installation, testing, balancing, and inspections to ensure a timely delivery of the project in accordance with the contract.
- B. Contractor shall schedule their work with all trades in advance to optimize system routing and reduce installation time.
- C. Contractor shall schedule and coordinate all interruptions of utilities or mechanical system operation in writing with the Owner's Representative at least one week in advance or as directed under Division 1.
- D. Coordinate commissioning and close-out testing activities with the Owner's Representative, design team, Commissioning Agent and all trades involved in the process. Coordinate timing of all commissioning activities into the master construction schedule.

1.07 Project Conditions

- A. Contractor shall field measure and verify dimensions prior to the fabrication and ordering of equipment.
- B. Contractor shall verify access routes for equipment and materials to be removed and installed without impacting finishes or the dismantling of equipment unless specifically noted in the Specifications and Plans.
- C. Immediately notify the Owner's Representative if any major damage, defect or deterioration of existing equipment, systems, or structural members is found on items noted to remain that will impact the successful installation and operation of new systems or create an unsafe environment.

1.08 Qualifications

- A. Manufacturers: All equipment and materials shall be provided from a manufacturer who has been in business for a minimum of three years and provides ready access to replacement parts.
- B. Installers: Contractor, subcontractors, and their supervisors shall have a minimum of three documented years of experience installing systems similar in type and size.

1.09 Submittals

- A. Provide submittals in accordance with the requirements of each Specification Section and Division 1.
- B. Submission Requirements:

1. Provide submittals for engineer's review electronically, in PDF format. Provide separate files for each Specification Section.
 - a. Provide Bookmarks for each piece of equipment and/or system.
2. The bulk of the shop drawings and product data, except controls and instrumentation, shall be included with the original submittal. Controls and Instrumentation submittals may be submitted separately, but shall be complete when submitted. Partial submittals will not be accepted.
3. All resubmittals shall include a cover sheet referencing each review comment and how the resubmittal resolves the comment. Changes from the original submittal shall be clearly identified including items that were previously approved.
4. Assure that all deviations from Plans and Specifications are specifically and clearly identified and called to the attention of the Engineer in the submittals. Failure to comply will void review automatically.

C. Product Data:

1. In general, submit product data for all materials, equipment, and appurtenances required for a complete and operational system. Include manufacturer's detailed shop drawings, specifications, performance information, and data sheets.
2. Clearly identify the model number and all accessories being provided. If the equipment is scheduled in the Plans, clearly show the equipment Tag/Identifier on the first page of that piece of equipment's submittal information.
3. Cross out accessories and options that are not being provided.
4. Indicate equipment dimensions and operating weights including bases and weight distribution at support points.
5. Identify equipment horsepower/watts/amperage, voltage, hertz, phase, and service factor.
6. For commodity items such as piping and ductwork, unless specifically noted otherwise within the specification, a general statement of what materials and joining methods may be provided for each type of system. For example, "Hydronic Heating Piping: Type L Copper, lead-free solder joints."

D. Shop Drawings:

1. Submit large scale dimensioned shop drawings of any custom equipment or system components.
 - a. Provide shop drawings for all products, systems, system components, and special supports which are not a standard catalog product and which may be fabricated for the Contractor or by the Contractor.

- b. Items to include, but not limited to:
 - 1). Ventilation hoods.
 - 2). Anti-vortex assemblies.
 - 2. Include shop drawings of plumbing systems integrated into the module construction. Shop drawing is to note not only how the plumbing device is being installed but also the construction and fastening/sealing system of the adjacent module system. Shop drawing submittal shall include, but not limited to, the following items:
 - a. Floor drains.
 - b. Emergency Shower drain receiver including grating system.
 - 3. Do not proceed with fabrication of materials until Shop Drawings have been submitted and approved.
- E. Coordination Drawings
 - 1. Prepare and submit Shop Drawings to demonstrate coordination of trades in the proper planning and installation and arrangement of all work as well as permanent access to equipment and maintainable items.
 - 2. Submit large scale dimensioned shop drawings of the following areas in the project:
 - a. All mechanical and plumbing systems.
 - 3. Coordination Drawings shall include the following systems overlaid in the same drawing:
 - a. Plumbing Systems
 - b. Water Treatment Systems
 - c. Heating Systems
 - d. Ventilation Systems
 - e. Control System major special components such as panels.
 - f. Electrical Systems as follows:
 - 1) Lights
 - 2) Panels, transfer switches, transformers
 - 3) Disconnects, motor starters, VFDs
 - 4) Conduits 3 inches and larger
 - 5) Cable trays
 - 6) Busways
 - 7) Power generation equipment
 - 4. Do not proceed with installation or fabrication of materials until Coordination Drawings have been submitted and approved.

F. Commissioning:

1. Coordinate additional submittal and start-up documentation with Commissioning specification sections.

1.010 Closeout Submittals

A. Provide closeout submittals in accordance with the requirements of each Specification Section and Division 1.

B. Operation and Maintenance Manual

1. Provide requirements noted under each Specification Section and in Division 1
2. The manuals shall be organized the same as under the Submittals section above.
3. Provide the Owner's Representative hard and electronic copies per Division 1.
4. Provide an index noting that the beginning of the manual noting each specification section and what materials/pieces of equipment are provided therein.
 - a. For electronic copies, provide Bookmarks for each piece of equipment and/or major system.
5. Provide a cover sheet for each piece of equipment that includes the following information:
 - a. General Contractor's name, address, and phone number.
 - b. Installing Contractor's name, address, and phone number.
 - c. Manufacturer's warranty contact information.
 - d. Nearest source of spare parts including company's name, address, and phone number.
6. Submit information on materials/equipment that will require regular maintenance. Items such as lavatory bowls need not be resubmitted. For each included item, provide the following:
 - a. Information noted under Submittals section above. Update information based on final installation.
 - b. Manufacturer's Operation and Maintenance manuals.
 - c. Exploded views of equipment.
 - d. Replacement parts list.
 - e. Capacity curves and charts.
 - f. Wiring diagrams.

- g. Assembly piping diagrams noting valves and system appurtenances.
 - h. Warranty information.
 - 7. Maintenance Schedules: For each piece of equipment or system that requires regular maintenance, provide a chart that includes the following:
 - a. Unique equipment identifier.
 - b. Maintenance activity as recommended by the manufacturer.
 - c. Time interval associated with each activity (annually, monthly, weekly, etc.).
 - d. Boxes for service providers to initial when scheduled service is completed.
 - 8. Startup and Shutdown Narratives: For each system and major piece of equipment, provide a written narrative on how to startup and shutdown the system.
 - a. Organize the narrative in a bulleted, checklist type format.
 - b. Identify specific valve numbers or equipment tags used in the process.
 - c. Include system schematics, screen shots, and/or photographs as required to convey information and processes.
- C. Record Drawings
 - 1. In addition to other requirements, mark up a clean set of Drawings as the work progresses, to show the dimensioned location and routing of all mechanical work which will become permanently concealed. Show routing and location of items cast in concrete or buried underground. Show routing of work in permanently concealed blind spaces within the building. Work located in spaces with access, or above suspended ceilings, is not considered permanently concealed. Show complete routing and sizing of any significant revisions to the systems shown.
 - 2. Make all markups in a color other than black, preferably red, to highlight the change.
 - 3. Show all contract changes including field directives and additional information provided by the design team during construction.
 - 4. Show the location of all valves.
 - 5. At completion of the project, deliver these drawings to the Owner's Representative and obtain written receipt.
- D. Provide the following items printed with non-fading ink and either framed with plexiglass or laminated and hung in the mechanical room:
 - 1. Valve directory that includes service and normal operating position.

2. Water treatment system and distribution schematic along with Functional Narrative
 3. Domestic water system schematic along with sequence of operation.
 4. Heating system schematic along with sequence of operation.
 5. Fuel system schematic along with sequence of operation.
 6. Ventilation system schematic along with sequence of operation.
 7. Additional maintenance instructions as noted within the specification section.
- E. Commissioning:
1. Coordinate additional close-out testing and documentation with Commissioning specification sections.

1.011 Electrical Work

- A. Reference the electrical Specifications and Plans for additional requirements.
- B. All electrical work, equipment, wiring, devices, and components shall comply with the requirements of local and national electrical codes and with Division 24, 25, 26, 27, and 28.
- C. Contractor shall verify the voltage and phase that will be available for the project. Bring to the immediate attention of the Engineer if the provided voltage and phase is different from that which is noted on the Plans or Specifications for equipment.
- D. Unless otherwise indicated on the electrical Plans or Specifications, provide all mechanical equipment motors, thermal overload switches, control relays, time clocks, thermostats, valve operators, float controls, damper motors, electric-pneumatic and pneumatic-electric switches, electrical components, wiring, and any other miscellaneous controls for equipment specified under Division 22 and 23.
- E. All electrical equipment, devices, and components that are tested by Underwriters Laboratories, Inc. shall be UL listed and shall bear a UL label.
- F. Starters and Disconnects: Suitable for performing the control functions required, with the exception of self-contained equipment and where the starters and/or disconnects are provided or furnished as part of the control package.
- G. Equipment Wiring: Interconnecting wiring within a piece of mechanical equipment shall be provided with the equipment unless required otherwise. This does not include the wiring of motors, starters, and controllers as provided under electrical Specifications.
- H. Control Wiring: All wiring for mechanical equipment shall be provided under this section.
- I. Mounting and Wiring:
 1. All 120 volt and higher wiring shall be installed by a licensed electrician.

2. Coordinate between the mechanical and electrical trades the installation of equipment electrical appurtenances such as starters, disconnects, VFDs, time clocks, controllers, line voltage thermostats and similar items.
3. Coordinate the installation and wiring of fire life-safety devices that impact the mechanical equipment such as duct smoke detectors, smoke dampers, smoke evacuation systems and equipment operation that is based on a signal from the fire alarm panel.

1.012 Use Of Mechanical Systems During Construction

- A. The Contractor shall request in writing to the Owner's Representative for the use of any plumbing or mechanical system during construction that is not limited to startup, testing or balancing.
- B. The use of equipment and systems during construction shall not alter the Warranty requirements of this Section and Division 1. The Contractor shall provide extended warranties as required to fulfill the requirements of the contract.
- C. Contractor shall pay for all utilities and fuel associated with the operation of the systems unless specifically noted otherwise under Division 1 or in writing from the Owner.

1.013 Delivery, Storage, And Handling

- A. Reference Division 1 for additional requirements.
- B. Ordering: Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.
- C. Delivery: Deliver materials free of defect in manufacturer's original, unopened, undamaged containers with identification labels intact.
- D. Storage: Provide adequate storage at the job site for timely access to materials.
 1. Provide heated storage for products such as mastics, caulking, and some electronic processors to maintain manufacturer's recommended minimum storage temperature.
 2. Store materials to protect from corrosion or warping.
- E. Protection: Protect materials from damage during construction.
- F. Piping, ductwork, and equipment shall have open ends capped or sealed during storage and installation.
- G. Module Delivery
 1. All equipment and materials are to be secured for shipment to final destination.
 2. Durably seal all openings into piping, ductwork, and modules for shipment.
 3. Remove and safely store exterior components such as ventilation hoods and boiler flues for travel.

4. Reinstall all components once modules are installed. Provide new gaskets as required for tight, no-leakage installation.

1.014 Spare Parts And tools

- A. Provide spare parts and tools as noted within each Section and within Division 1.

1.015 INSPECTIONS

- A. Reference Division 1 for additional requirements.
- B. All work and materials shall be available for inspection by the Owner's Representative, the Design Team, and the Authority Having Jurisdiction at all times.

1.016 Warranty

- A. Warranty information shall be provided to the more stringent requirements of this Section, Division 1 and the specific specification Sections.
- B. Provide manufacturers written warranties for material and equipment furnished including parts and labor for a period of one year from the date of Owner acceptance of work.
- C. Correct warranty items promptly upon notification.

PART 2 - PRODUCTS

2.01 Materials And Equipment

- A. All materials and equipment shall be new unless specifically noted in the contract documents.
- B. Provide materials and equipment from major and reputable manufacturers that have the availability of local service providers and expeditious access to spare parts.
- C. Provide all materials that are incidental to the installation of equipment and systems to include, but not limited to fasteners, sealants, mastics, tapes, caulking, gaskets, grout, fluxes and solder, etc.
- D. Provide materials from the same manufacturer where possible.
- E. All materials shall be free of asbestos and other hazardous materials.
- F. All materials in contact with domestic and potable water shall be free of lead and be certified compliant with NSF 61.

2.02 Motors

- A. Reference Division 26 for additional requirements.
- B. Motors shall be furnished as an integral part of driven equipment.

- C. Motors shall be listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to Authorities Having Jurisdiction, and marked for intended use.
- D. Motors shall be built to NEMA standards for the service intended.
- E. Motors shall be rated for the voltage specified, suitable for operation within the range of 10 percent above to 10 percent below the specified voltage.
- F. Service Factor: Motors 1/2 HP and larger to have minimum service factor of 1.15 unless noted otherwise.
- G. Duty: Continuous duty at ambient temperature of 105 deg F and at altitude of 3300 feet above sea level.
- H. Overload Protection: Motors under 1/2 HP shall have internal overload protection.
- I. Provide single speed, 1750 RPM motors unless otherwise noted.
- J. Inverter Ready: All motors over 1/2 HP shall be inverter ready.
- K. Efficiency: Premium Efficiency.
- L. Enclosure: Unless otherwise noted, indoor installations to be Open Drip-Proof (ODP) and outside installations to be Totally Enclosed Fan-Cooled (TEFC). Motors in hazardous (classified) areas shall be rated for the classification.
- M. Insulation: Provide motors with minimum Class F insulation.
- N. Belt Drive Motors: Furnish drives on belt drive equipment of not less than 150 percent of equipment brake horsepower required for performance specified.
- O. Variable Speed Driven Motors:
 - 1. Provide Energy- and Premium Efficient Motors: Minimum Class B temperature rise, Class F insulation.
 - 2. Inverter-Duty Motors: Minimum Class F temperature rise, Class H insulation.
 - 3. Provide integral shaft grounding ring.

PART 3 - EXECUTION

3.01 Examination

- A. Reference Division 1 and 2 for additional requirements.
- B. Site Verification of Conditions: Verify that site conditions are acceptable for installation of materials. Do not proceed with installation until unacceptable conditions are corrected.

3.02 Installation

- A. Install all materials and equipment in accordance with the manufacturer's recommendations and local codes.
- B. All work shall be installed professionally and to industry best practices.

3.03 Painting

- A. Painting shall comply with the requirements of Division 9 Specifications.
- B. Paint equipment, piping, and materials as noted in the Plans and within specific Sections.
- C. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.04 Erection Of Metal Supports And Anchorage

- A. Reference Division 5 for additional requirements.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.
- C. Field Welding: Comply with AWS D1.1.

3.05 Motor Installation

- A. Remove transportation braces from vibration platforms.
- B. Align motors, bases, and shafts.
- C. Verify motor operation is free of vibration under all conditions.
- D. Verify bearing lubrication prior to operating.
- E. Verify proper motor rotation.
- F. Verify amperage draw for all phases under design conditions is below nameplate rating.
- G. Belt Driven Equipment:
 - 1. Align pulleys and belts.
 - 2. Tension belts according to manufacturer's recommendations.
 - 3. Verify belt guards are in place.

3.06 Startup

- A. Startup shall be provided to the more stringent requirements of this Section, Division 1 and the specific specification Sections.
- B. Startup all equipment in accordance with manufacturer's instructions.
- C. Ensure connected systems are clean of debris and ready for system testing.
- D. Coordinate electrical and other trades work to complete timely startup of all equipment and systems.

3.07 Training

- A. Training shall be provided to the more stringent requirements of this Section, Division 1 and the specific specification Sections.

- B. The Contractor shall provide a minimum of 20 hours of instruction on the operation and maintenance of the installed systems and equipment.
 - 1. Coordinate with the Owner the personnel that are to attend.
 - 2. Training shall be scheduled for the time(s) that best fits the Owner's personnel's time schedule.
- C. The Operation and Maintenance Manual shall be used as a guide during the training.
- D. Equipment training shall be provided by a factory trained representative unless otherwise noted.
- E. Training shall include a classroom portion and a field portion.
 - 1. The classroom portion of the training shall include the following:
 - a. Overview of the systems and their orientation within the facility.
 - b. "Big picture" explanation of the systems as a whole and how they operate.
 - c. Specific equipment training including preventative maintenance activities, using the manufacturer's maintenance guide as a reference.
 - d. Additional training items appropriate for a classroom environment.
 - 2. The field portion shall be onsite and shall include the following:
 - a. Building walk through identifying the locations of all equipment, isolation valves, control/fire dampers, and other items that will be accessed during the operation of the facility. Reference the Plans during the walk through for orientation.
 - b. Step-by-step procedures on how to startup and shutdown the systems and pieces of equipment.
 - c. Regular maintenance activities as identified in the Operations Manual's regular Maintenance Schedules.
 - d. Point out specific maintenance appurtenances such as grease fittings, valves, and control panel buttons used during maintenance and daily operation activities.
 - e. Walk through control panel and sensor user interfaces and explain what each screen is showing as well as how to change system setpoints through the interface.
- F. All training shall be digitally video recorded.
 - 1. Videos shall be converted to cross-platform, open source formats such as MP4 or equal.
 - 2. Videos shall be separated by equipment and system. File names shall clearly indicate the training contents.

3. Submit 3 copies of the recorded training to the Owner either via DVD or solid state storage device such as a USB Flash Drive.
- G. Certification: A paper survey shall be provided to each trainee immediately after the end of each training session.
1. The survey shall include scoring on if the training was applicable, helpful, and sufficient.
 2. All surveys are to be submitted to the Owner's Representative.
 3. If a training session was deemed to be not helpful, applicable, or complete, the Contractor shall provide additional training at no additional cost to the Owner.

3.08 Testing

- A. Testing is to be completed in accordance with the requirements of Division 1 and the specific specification Sections.
- B. Testing is to comply with the minimum requirements of all codes and regulations.

END OF COMMON WORK RESULTS FOR MECHANICAL

SECTION 23 05 29

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 Summary

A. Section Includes:

1. Pipe hangers and supports.
2. Hanger rods.
3. Flashing.
4. Sleeves.
5. Mechanical sleeve seals.
6. Formed steel channel.
7. Firestopping
8. Equipment Bases and Supports:

1.02 Submittals

- A. Shop Drawings: Indicate system layout with location including critical dimensions, sizes, and pipe hanger and support locations and detail of trapeze hangers.
- B. Product Data:
 1. Hangers and Supports: Manufacturers catalog data including load capacity.
- C. Design Data: Indicate load-carrying capacity of trapeze, multiple pipe, and riser support hangers. Indicate calculations used to determine load carrying capacity of trapeze, multiple pipe, and riser support hangers.
- D. Manufacturer's Installation Instructions:
 1. Hangers and Supports: Special procedures and assembly of components.
- E. Manufacturer's Certificate: Products meet or exceed specified requirements.

1.03 Quality Assurance

- A. Fire-Resistant Joints in Fire-Rated Floor, Roof, and Wall Assemblies: UL 2079 to achieve fire resistant rating as indicated on Drawings for assembly in which joint is installed.
- B. Fire-Resistant Joints Between Floor Slabs and Exterior Walls: ASTM E119 with 0.10 inch wg minimum positive pressure differential to achieve fire resistant rating as indicated on Drawings for floor assembly.
- C. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested according to ASTM E84.
- D. Perform Work according to AWS D1.1 for welding hanger and support attachments to building structure.

- E. Passivate stainless steel welds per ASTM A967. Confirm absence of free iron in heat affected zone using ASTM A967, Copper Sulfate Test, Practice C.
- F. Manufacturer: Company specializing in manufacturing products specified in this Section with three years' experience.
- G. Installer: Company specializing in performing Work of this Section with three years' experience.

1.04 Field Measurements

- A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

1.01 Pipe Hangars And Supports

A. Manufacturers:

1. Carpenter & Paterson, Inc.
2. ERICO International Corporation
3. Unitron Product, Inc. / US-Strut
4. Substitutions: Permitted.

B. Hydronic Piping:

1. Hangars shall be hot-dipped galvanized or stainless steel.
2. Conform to MSS SP69.
3. Hangars for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron or steel, adjustable swivel, split ring.
4. Hangars for Cold Pipe Sizes 2 inches and Larger: Steel, adjustable, clevis.
5. Hangars for Hot Pipe Sizes 2 to 4 inches: Steel, adjustable, clevis.
6. Hangars for Hot Pipe Sizes 6 inches and Larger: Adjustable steel yoke, cast iron roll, double hanger.
7. Multiple or Trapeze Hangars: Steel channels with welded spacers and hanger rods.
8. Multiple or Trapeze Hangars for Hot Pipe Sizes 6 inches and Larger: Steel channels with welded spacers and hanger rods, cast iron roll.
9. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hooks.
10. Wall Support for Pipe Sizes 4 inches and Larger: Welded steel bracket and wrought steel clamp.
11. Wall Support for Hot Pipe Sizes 6 inches and Larger: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
12. Vertical Support: Steel riser clamp.

13. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
14. Floor Support for Hot Pipe Sizes 4 Inches and Smaller: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
15. Floor Support for Hot Pipe Sizes 6 inches and Larger: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
16. Copper Pipe Support: Vinyl coated, steel adjustable ring.

1.02 Accessories

- A. Hanger Rods: Stainless steel threaded both ends, threaded on one end, or continuous threaded.

1.03 Flashing

- A. Metal Flashing: 26 gage stainless steel.
- B. Metal Counterflashing: 22 gage stainless steel.
- C. Lead Flashing:
 1. Waterproofing: 5 lb./sq. ft sheet lead.
 2. Soundproofing: 1 lb./sq. ft sheet lead.
- D. Flexible Flashing: 47 mil thickness sheet butyl; compatible with roofing.
- E. Caps: Stainless steel, 22 gage minimum; 16 gage at fire-resistant elements.

1.04 Sleeves

- A. Sleeves for Pipes Through Non-fire Rated Floors: 18 gage galvanized steel.
- B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Stainless steel pipe.
- C. Sleeves for Round Ductwork: Galvanized steel.
- D. Sleeves for Rectangular Ductwork: Galvanized steel.
- E. Sealant: Acrylic.

1.05 Mechanical Sleeve Seals

- A. Manufacturers:
 1. Link-Seal
 2. Substitutions: Permitted.
- B. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

1.06 Formed Steel Chain

- A. Product Description: Galvanized or stainless 12 gage thick steel. With holes 1-1/2 inches on center.

1.07 Firestopping

- A. Firestopping Materials: Acrylic based flexible firestop sealant, UL listed and FM approved.

1.08 Equipment Bases And Support

- A. All floor or floor stand-mounted equipment shall be set on concrete housekeeping pads. The height of the pads shall be as recommended by the equipment manufacturer, as required to connect to piping or as shown on drawings. The height shall be sufficient to accommodate required anchorage devices.
- B. The pads shall extend 3 inches beyond the machine base in all directions unless otherwise indicated on the drawings or by the equipment manufacturer. The top edges of the pads shall be chamfered.
- C. Concrete work shall be in accordance with Division 3.

PART 3 - EXECUTION**1.01 Preparation**

- A. Obtain permission from Architect/Engineer before using powder-actuated anchors.
- B. Do not drill or cut structural members.

1.02 Installation**A. Pipe Hangers and Supports:**

1. Install according to MSS SP 69.
2. Support horizontal piping as scheduled.
3. Install hangers with minimum 1/2 inch space between finished covering and adjacent Work.
4. Place hangers within 12 inches of each horizontal elbow.
5. Use hangers with 1-1/2 inch minimum vertical adjustment.
6. Support vertical piping at every floor.
7. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.
8. Support riser piping independently of connected horizontal piping.
9. Provide vinyl coated hangers and supports in contact with copper piping.
10. Design hangers for pipe movement without disengagement of supported pipe.

11. Provide clearance in hangers and from structure and other equipment for installation of insulation. Refer to Section 22 07 00.

B. Equipment Bases and Supports:

1. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.
2. Construct supports of steel members or formed steel channel. Brace and fasten with flanges bolted to structure.
3. Provide rigid anchors for pipes after vibration isolation components are installed.

C. Flashing:

1. Provide flexible flashing and metal Counterflashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.
2. Provide acoustical lead flashing around ducts and pipes penetrating equipment rooms for sound control.
3. Provide curbs for roof installations 14 inches minimum high above roofing surface. Flash and counter-flash with stainless steel sheet metal; seal watertight. Attach Counterflashing to equipment and lap base flashing on roof curbs. Flatten and solder joints.
4. Adjust storm collars tight to pipe with bolts; caulk around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.

D. Sleeves:

1. Exterior watertight entries: Seal with mechanical sleeve seals.
2. Set sleeves in position in forms. Provide reinforcing around sleeves.
3. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
4. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.
5. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent Work with firestopping insulation and caulk airtight per firestopping manufacturer's instructions. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
6. Install stainless steel escutcheons at finished surfaces.

1.03 Schedules

A. Copper and Steel Pipe Hanger Spacing:

PIPE SIZE INCHES	COPPER TUBING MAXIMUM HANGER SPACING FEET	STEEL PIPE MAXIMUM HANGER SPACING FEET	COPPER TUBING HANGER ROD DIAMETER INCHES	STEEL PIPE HANGER ROD DIAMETER INCHES
1/2	5	7	3/8	3/8
3/4	5	7	3/8	3/8
1	6	7	3/8	3/8
1-1/4	7	7	3/8	3/8
1-1/2	8	9	3/8	3/8
2	8	10	3/8	3/8
2-1/2	9	11	1/2	1/2
3	10	12	1/2	1/2
4	12	14	1/2	5/8
5	13	16	1/2	5/8
6	14	17	5/8	3/4
8	16	19	3/4	3/4

B. Plastic and Ductile Iron Pipe Hanger Spacing:

PIPE MATERIAL	MAXIMUM HANGER SPACING FEET	HANGER ROD DIAMETER INCHES
ABS (All sizes)	4	3/8
PP-R (Note 1)		
PVC & CPVC(All Sizes)	4	3/8
Ductile Iron (Note 2)		

C. Note 1: Refer to manufacturer's recommendations.

D. Note 2: 20 feet maximum spacing, minimum of one hanger for each pipe section close to joint behind bell. Provide hanger at each change of direction and each branch connection. For pipe sizes 6 inches and smaller, subjected to loadings other than weight of pipe and contents, limit span to maximum spacing for water service steel pipe.

END OF HANGARS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

SECTION 23 10 00 FUEL-OIL SYSTEM

PART 1 - GENERAL

1.01 Summary

- A. Section Includes:
 - 1. Fuel oil piping.
 - 2. Unions and flanges.
 - 3. Valves.
 - 4. Fuel trim accessories
 - 5. Pipe hangers and supports.
 - 6. Flexible connectors.
 - 7. Fuel oil storage tank.

1.02 Submittals

- A. Shop Drawings:
 - 1. Fuel Storage Tank: Indicate tank construction and dimensions, including tappings.
- B. Product Data:
 - 1. Piping: Data on pipe materials, fittings, and accessories. Submit manufacturers catalog information.
 - 2. Valves: Manufacturer's catalog information with valve data and ratings for each service.
 - 3. Hangers and Supports: Manufacturer's catalog information including load capacity.
 - 4. Fuel Piping Specialties: Manufacturer's catalog information including capacity, rough-in requirements, and service sizes.
 - 5. Fuel Oil Storage Tank Appurtenances: Manufacturer's catalog information
- C. Test Reports: Written test results for piping system pressure test.
- D. Welders Certificates: AWS certified within previous 12 months.

1.03 Quality Assurance

- A. Perform Work according to NFPA 30.
- B. List and label flexible connectors and hoses according to UL 536.
- C. Perform Work according to ASME B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.

- D. Perform Work according to applicable code for welding hanger and support attachments to building structure.
- E. Perform Work according to State of Alaska standards.
- F. Manufacturer: Company specializing in manufacturing products specified in this Section with three years' experience.
- G. Installer: Company specializing in performing Work of this Section with three years' experience.

1.04 Field Measurements

- A. Verify field measurements prior to fabrication.

1.05 Spare Parts

- A. Provide touch-up primer and paint for fuel tank.
- B. Provide one extra filter for all fuel filter assemblies.

PART 2 - PRODUCTS

2.01 Fuel Oil Piping – Above Ground

- A. Steel Pipe: ASTM A53/A53M or ASME B36.10M Schedule 40 black.
 - 1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M wrought carbon steel and alloy steel welding type.
 - 2. Joints: Threaded for pipe 2 inch and smaller; welded for pipe 2-1/2 inches and larger.
- B. Copper Tube: ASTM B88, Type K annealed seamless copper tubing
 - 1. Fittings and joints: ASME B16.26 flared fittings

2.02 Unions And Flanges

- A. Unions for Pipe 2 inches and Smaller:
 - 1. Ferrous Piping: Class 150, malleable iron, threaded.
 - 2. Copper Tubing: ASME B16.22, wrought copper alloy body, solder joint and threaded ends.

2.03 Ball Valves

- A. Manufacturer: Anderson Brass, “Kantleak” or equal.
- B. MSS SP 110, Class 125, two piece, full port, threaded ends, bronze or brass body, chrome plated bronze ball, Viton or Buna-N double o-rings, lever handle, UL 842 listed for flammable liquids and LPG, full port.

2.04 Check Valves

- A. Horizontal Swing Check Valves:

1. MSS SP 80, Class 150, bronze body and cap, bronze seat, Buna-N disc, threaded ends.

2.05 Fuel Trim Accessories

A. Oil De-aerator

1. Basis of Design: Westwood Products Tigerloop Ultra, model S220-8 or approved equal.
2. De-aerator: UL listed oil de-aerator with glass bulb and 1/4 NPTF connections. Rated for maximum nozzle capacity of 20 GPH, inlet pressure of 8 PSI, operating temperature of 20 to 105 degrees F.
3. Filter: Spin on, 10 micron filter element, inside epoxy lined canister.

B. Fusible Valve

1. Manufacturer: Firomatic or approved equal.
2. UL 842 listed, brass, gate type, viton seals, with spring and replaceable fusible element, manually operable, flare connections.

C. Oil Safety Valve

1. Manufacturer: Webster or approved equal.
2. UL listed, 1/2 inch NPTF connections.

D. Oil Filter

1. Manufacturer: General Filter Model 2A-700 or approved equal.
2. UL listed, 12 psi working pressure, 25 GPH firing rate, 25 micron wool felt filtering media with 83 square inch filtering surface, and 3/4 inch threaded connections.

2.06 Pipe Hangars And Supports

- A. Conform to MSS SP 69 and MSS-SP 89.
- B. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Carbon steel, adjustable swivel, split ring.
- C. Hangers for Pipe Sizes 2 inches and Larger: Carbon steel, adjustable, clevis.
- D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- E. Wall Support for Pipe 3 inches and Smaller: Cast iron hook.
- F. Vertical Support: Steel riser clamp.
- G. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

2.07 Flexible Connectors

- A. Interior 2 inches and Smaller: UL Listed, corrugated stainless steel inner hose with single layer of Type 304 stainless steel exterior braiding, with threaded ends.
 - 1. Boilers: 24 inches long
 - 2. All other connections: Min 16 inches long
- B. Exterior Applications, 2 inches and Smaller: UL536 Listed, 321 stainless steel annual closed pitch corrugated hose, 304 stainless steel braid, 300 stainless steel ferrule, beveled weld ends.
 - 1. Length: Minimum 18 inches.
 - 2. Offset: Minimum 1" with 60 degree angular deflection.
 - 3. Basis of Design, Flex-Hose model UFFWN-UL or approved equal.

2.08 Fuel Oil Storage Tank

- A. Product Description: Aboveground, double wall, steel storage tank. Manufactured according to UL 142 and labeled.
- B. Storage Tank: Welded steel, horizontal cylindrical, with steel support saddles on steel skids.
- C. Tank Exterior Finish: Salt-spray corrosion resistant system. Material thicknesses per manufacturer's Technical Data Sheet (TDS) recommendations.
 - 1. Manufacturer: Devoe
 - 2. Primer: Cathacoat 302H
 - 3. Epoxy mid-coat: Bar-Rust 236
 - 4. Polyurethane: Devthane 389
- D. Storage Tank: Fabricated with following:
 - 1. Threaded connections as shown on the drawings. Furnish thread protectors inserted in threaded openings prior to shipment.
- E. Accessories:
 - 1. OSHA approved external ladder, galvanized steel or aluminum, rated for 300 pounds.
 - 2. Lifting Lugs: For handling and installation.
 - 3. Tank Decals: Furnish warning and tank identification signs located prominently on tank following local fire code requirements.
 - 4. Fill container: 7-1/2 gallon overfill containment chamber with hinged cover, stainless steel hinges, handle, safety chain, and lock hasp. Provide 2" male threads for installation of overfill prevention valve below tank. Morrison Bros. 518M-0200 AC or equal.

5. Overfill Valve: 2 inch, float type overfill prevention valve, stainless steel cam and dust plug/cap. Minimum 5 psi flow requirement. Morrison Bros. Model 9095AA or equal.
 - a. Provide drop fill tube.
6. Aluminum T-type screened vent caps for normal vents for primary tank and secondary containment. Morrison Bros. model 155 or equal.
 - a. Provide aluminum risers.
7. Emergency Vents: Furnish for each compartment emergency vent sized in accordance with NFPA 30 and UL 142. Height to exceed top of fill container. OPW 301 Series or equal.
8. Level Gauge: Mechanical float activated level gauge capable of indicating approximate fluid level in the tank, read in feet and inches. OPW model 200TG or approved equal.
9. Anti-siphon valve for supply line to daytank, OPW 199ASV or equal, 5 feet to 10 feet of head hydrostatic head pressure.
10. Leak Gauge: HDPE plastic housing assembly with aluminum bushing. Aluminum internal rods and HDPE float. Krueger Sentry Gauge, Type K or equal.
 - a. Provide gauge guard.
11. Suction tube with foot valve.
12. Fuel return and fill drop tube to within 6 inches of bottom of tank.
 - a. Return pipe to have holes drilled within 6 inches of the top of the tank.

PART 3 - EXECUTION

3.01 Preparation

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Prepare piping connections to equipment with flanges or unions.
- C. Fuel storage tank finishes are to be applied at the tank manufacturing facility under environmental conditions approved by the finish manufacturer's recommendations.

3.02 Installation

- A. Pipe Hangers and Supports:
 1. Install hangers and supports according to ASME B31.9, and MSS SP 89.
 2. Support horizontal piping hangers maximum 6 feet.
 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent Work.

4. Place hangers within 12 inches of each horizontal elbow.
5. Install hangers to allow 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
6. Where installing several pipes in parallel and at same elevation, provide multiple pipe hangers or trapeze hangers.
7. Finish paint exposed steel hangers and supports according to Section 099000.
8. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

B. Aboveground Piping:

1. Install fuel oil piping according to NFPA 31.
2. Provide non-conducting dielectric connections wherever jointing dissimilar metals. Install according to NACE RP-01-69.
3. Route piping in orderly manner and maintain gradient.
4. Install piping to conserve building space and not interfere with use of space.
5. Group piping whenever practical at common elevations.
6. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
7. Sleeve pipe passing through partitions, walls and floors.
8. Prepare pipe, fittings, supports, and accessories not pre-finished, ready for finish painting. Refer to Section 099000.
9. Finish paint interior and exterior fuel oil pipe, fittings, supports, and accessories in bright yellow. Refer to Section 099000.
10. Install valves with stems upright or horizontal, not inverted.
11. Protect piping systems from entry of foreign materials by temporary covers, completing Sections of Work, and isolating parts of completed system.

C. Fuel Oil Storage Tank Installation

1. Install tank on level surface.
2. Install tank per NFPA 30, NFPA 31, and STI R912 requirements.
3. Install normal vent caps at 12 feet above grade.
4. Resurface any blemishes and scrapes by applying primer, mid-coat, and polyurethane coatings to maximize corrosion resistance.

3.03 Field Quality Control

- A. Pressure-test fuel oil piping according to NFPA 31.

END OF FUEL OIL SYSTEM

SECTION 23 20 00 HVAC PIPING AND PUMPS

PART 1 - GENERAL

1.01 Summary

- A. Section Includes:
 - 1. Pipe and pipe fittings.
 - 2. Pipe hangers and supports.
 - 3. Valves.
 - 4. Piping specialties.
 - 5. HVAC piping specialties.
 - 6. HVAC pumps.
 - 7. Glycol makeup system
 - 8. Glycol solution.

1.02 Submittals

- A. Product Data:
 - 1. Pipe Hangers and Supports: Submit manufacturers catalog data including load carrying capacity.
 - 2. Valves: Submit Manufacturers catalog information with valve data and ratings for each service.
 - 3. Piping Specialties: Submit product description, model, dimensions, component sizes, rough-in requirements, service sizes, and finishes. Submit schedule indicating manufacturer, model number, size, location, rated capacity, load served, and features for each specialty.
 - 4. Pipe Expansion Products: Indicate maximum temperature and pressure rating, and maximum expansion compensation.
 - 5. Pumps: Submit pump type, capacity, certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable. Include electrical characteristics and connection requirements. Include manufacturer's catalogue information.
- B. Shop Drawings: Reference Section 230500, Common Work Results for Mechanical.
 - 1. Provide shop drawings of floor and wall based pipe support systems including weight ratings for each connection point. Reference 220548, Vibration and Seismic Controls.

- C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.03 Quality Assurance

- A. Perform Work in accordance with of State of Alaska standards.

1.04 Maintenance Service

- A. Furnish the following spare parts:
 - 1. One extra set of mechanical seals for pumps.

PART 2 - PRODUCTS

2.01 Pipes and Tubes

- A. Heating Water Piping:
 - 1. Copper Tubing: ASTM B88, Type L drawn, cast brass, wrought copper, or mechanically extracted fittings, lead free solder joints.
- B. Equipment Drains and Overflows:
 - 1. Steel Pipe: ASTM A53/A53M, Grade B, Schedule 40 black steel, malleable iron or forged steel fittings, threaded or welded joints.
 - 2. Copper Tubing: ASTM B88, Type L, drawn, cast brass, wrought copper fittings, lead free solder joints.
 - 3. PVC Pipe: ASTM D1785, Schedule 40, or ASTM D2241, SDR 21 or 26, PVC fittings, solvent weld joints.

2.02 Pipe Hangars And Supports

- A. Conform to MSS SP 69.
- B. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Carbon steel, adjustable swivel, split ring.
- C. Hangers for Cold Pipe Sizes 2 inches and Over: Carbon steel, adjustable, clevis.
- D. Hangers for Hot Pipe Sizes 2 to 4 inches: Carbon steel, adjustable, clevis.
- E. Multiple or Trapeze Hangers for Pipe Sizes to 4 inches: Steel channels with welded spacers and hanger rods.
- F. Wall Support for Pipe Sizes to 3 inches: Cast iron hooks.
- G. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- H. Copper Pipe Support: Copper-plated, carbon steel ring.

2.03 Valves

- A. Ball Valves:

1. Bronze or stainless steel one piece body, chrome plated brass ball, Teflon seats and stuffing box ring, lever handle, solder or threaded ends.
- B. Butterfly Valves:
 1. Bronze body, stainless steel disc, resilient replaceable seat, threaded ends, extended neck, lever handle.
- C. Swing Check Valves:
 1. Bronze body and swing disc, solder or threaded ends.
- D. Relief Valves:
 1. Bronze body, Teflon seat, stainless steel stem and springs, automatic, direct pressure actuated capacities ASME certified and labeled.

2.04 Piping Specialties

- A. Flanges, Unions, and Couplings:
 1. Malleable iron unions for threaded ferrous piping; bronze unions for copper pipe, soldered joints.
 2. Dielectric Connections: Provide dielectric nipples or flanges. Dielectric unions are not allowed.
- B. Strainers:
 1. All strainers to be able to receive blow-down ball valve connections.
 2. Threaded brass or iron body for 175 psig working pressure, Y pattern with 1/32 inch stainless steel perforated screen.
- C. Flexible Connectors:
 1. Corrugated stainless steel hose with single layer of stainless steel exterior braiding, minimum 9 inches long with copper tube ends; for maximum working pressure 300 psig.
- D. Air Vents:
 1. Manual Type: Short vertical sections of 2 inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.
 2. Float Type: Brass or semi-steel body, copper, polypropylene, or solid non-metallic float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.
- E. Pressure Gages:
 1. Gage: ASME B40.1, UL 393 with bourdon tube, rotary brass movement, brass socket, front calibration adjustment, black scale on white background.
 - a. Case: Steel.
 - b. Bourdon Tube: Phosphor bronze.

- c. Dial Size: 3-1/2 inch diameter.
 - d. Mid-Scale Accuracy: One percent.
 - e. Scale: Psi.
 - f. Range: Selected for mid-range at normal operating conditions for the application.
- F. Thermometers:
 - 1. Adjustable angle, digital display, light powered, ABS case with enamel finish, cast aluminum adjustable joint with positive locking device.
 - a. Size: 7-inch case
 - b. Power source: Photovoltaic cells requiring 10 lux of illumination for operation.
 - c. Display: 9/16 inch LCD, 4 digits, 1/10 degree resolution. switchable between F and C, updated every 10 seconds.
 - d. Stem: Aluminum, 3/4 inch NPT, 3-1/2 inch long, with glass passivated thermistor.
 - e. Range: Minus 40 to 300 degrees F (minus 40 to 150 degrees C)
 - f. Accuracy: 1 percent or 1 degree F, whichever is greater

2.05 HVAC Piping Specialties

- A. Diaphragm-Type Expansion Tanks
 - 1. Manufacturers:
 - a. Amtrol.
 - b. Taco.
 - c. Substitutions: Permitted.
 - 2. Construction: Welded steel, rated for working pressure of 100 psig, with flexible butyl/EPDM diaphragm sealed into tank and steel support stand.
 - 3. Accessories: Pressure gage and air-charging fitting, tank drain; pre-charge to 12 psig.
- B. Air Separators:
 - 1. Manufacturers:
 - a. Spirotherm.
 - b. Substitutions: Permitted.
 - 2. In-line Air Separators: Welded Steel; designed and constructed for 150 psig working pressure.
 - a. Woven copper wire and copper tube internal element to remove entrained air and to coalesce and remove microbubbles.

2.06 HVAC Pumps

- A. Manufacturers:
 - 1. Grundfos.
 - 2. Taco.
 - 3. Substitutions: Permitted.
- B. System Lubricated Circulators
 - 1. Type: Horizontal shaft, single stage, direct connected with multiple speed wet rotor motor for in-line mounting, for 140 psig maximum working pressure, 230 degrees F maximum water temperature.
 - 2. Construction: Cast iron casing flanged pump connections, stainless steel impeller, shaft, and rotor, impedance protected motor.
- C. Variable Speed Wet Rotor Circulators
 - 1. Type: In-line wet rotor design. The pump, motor, and variable speed drive shall be an integral product.
 - 2. The pump shall be labeled on the nameplate as having an Energy Efficiency Index (EEI) of no greater than 0.20.
 - 3. Construction: Cast iron housing, stainless steel impellers and shaft, carbon graphite thrust bearing, EPDM O-rings.,
 - 4. Motor: 4-pole permanent-magnet motor, cooled by the fluid, self-ventilating, Minimum Class F insulation.
 - 5. Operating Modes:
 - a. Back-Up Operation: Two pumps, operated in a primary/back-up configuration shall communicate wirelessly to one another. One pump shall operate at a time with the other pump turning on automatically if the primary pump fails.
 - 6. Controls: Operator interface, integral sensor, one analog input, three digital inputs, two outlet relays.
 - 7. Add-On Modules:
 - a. Modbus

2.07 Glycol Makeup System

- A. Packaged glycol makeup system: Polyethylene solution container sized as noted on the drawings, complete with lid, glycol charging pump, strainer and shut-off valve. Removable lid shall have a hole to accommodate system safety relief valve discharge pipe in such a way that lid remains removable for filling and mixing without modifying the piping.
- B. Pumping Assembly: The pressurization assembly shall consist of a pressurization pump with pressure controls, a pre-pressurized storage tank, a PRV, and pressure

gauge to continuously monitor PRV outlet pressure. Pump shall be set to maintain glycol system pressure of 12 psig, adjustable between 8 psig and 25 psig.

2.08 Glycol Solution

- A. Manufacturers:
 - 1. Dow Chemical Co.
 - 2. Substitutions: Permitted.
- B. Inhibited propylene glycol and water solution mixed 50 percent glycol / 50 percent water, suitable for operating temperatures from minus 40 degrees F to 250 degrees F.

PART 3 - EXECUTION

3.01 Examination

- A. Verify excavations are to required grade, dry, and not over-excavate.

3.02 Preparation

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside piping before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.03 Installation – Piping System

- A. Install heating water piping in accordance with ASME B31.9.
- B. Install dielectric connections wherever jointing dissimilar metals.
- C. Install unions downstream of valves and at equipment or apparatus connections.
- D. Route piping parallel to building structure and maintain gradient.
- E. Install piping to maintain headroom. Group piping to conserve space. Group piping whenever practical at common elevations.
- F. Slope piping and arrange systems to drain at low points.
- G. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- H. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- I. Sleeve pipe passing through partitions, walls and floors.
- J. Install piping system allowing clearance for installation of insulation and access to valves and fittings.
- K. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

3.04 Installation – Module Construction

- A. Provide removable pipe sections at module seams with unions or flanges.
 - 1. Pipe sections to be installed during initial testing.
 - 2. Pipe sections are then to be removed, drained, sealed, and packaged for shipment. Label the pipe sections to identify exact location for field reinstallation.
 - 3. Piping is then to be reinstalled after field assembly of the modules.
 - 4. Final installation is then to be tested, sterilized, and final insulation and pipe identifications added as needed.

3.05 Installation – Pipes And Supports

- A. Support horizontal piping as scheduled.
- B. Install hangers with minimum 1/2 inch space between finished covering and adjacent work.
- C. Place hangers within 12 inches of each horizontal elbow.
- D. Use hangers with 1-1/2 inch minimum vertical adjustment.
- E. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.
- F. Support vertical piping at every other floor. Support vertical cast iron pipe at each floor at hub.
- G. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.
- H. Support riser piping independently of connected horizontal piping.
- I. Provide copper plated hangers and supports for copper piping.
- J. Design hangers for pipe movement without disengagement of supported pipe.

3.06 Installation - Valves

- A. Install valves with stems upright or horizontal, not inverted.
- B. Install gate, ball or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- C. Install globe, ball or butterfly valves for throttling, bypass, or manual flow control services.
- D. Provide lug end butterfly valves adjacent to equipment when functioning to isolate equipment.
- E. Install 3/4 inch ball drain valves with hose thread adapter and cap at low points of piping, and at equipment.

3.07 Installation – Piping Specialties

- A. Install one pressure gage for each pump, locate taps before strainers and on suction and discharge of pump; pipe to gage.
- B. Install pressure gages with pulsation dampers. Provide needle valve or ball valve to isolate each gage. Extend nipples to allow clearance from insulation.
- C. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inches for installation of thermometer sockets. Allow clearance from insulation.
- D. Install gages and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
- E. Adjust gages and thermometers to final angle, clean windows and lenses, and calibrate to zero.
- F. Install manual air vents at system high points.
- G. Provide drain and hose connection with valve on strainer blow down connection.
- H. Select system relief valve capacity greater than make-up pressure reducing valve capacity. Select equipment relief valve capacity to exceed rating of connected equipment. Install piping from relief valve outlet to nearest floor drain.
- I. Pipe relief valve outlet to nearest floor drain, or to glycol fill system as shown.
- J. Support piping adjacent to pump so no weight is carried on pump casings. For close coupled or base mounted pumps, install supports under elbows on pump suction and discharge line sizes 4 inches and over.
- K. Support tanks inside building from building structure.

3.08 Field Quality Control

- A. Pressure test piping in accordance with the International Mechanical Code.
 - 1. Piping to be tested at 50% above operating pressure or 50 psi at a minimum.
 - 2. Do not install pressure gauges until after the test.
 - 3. Isolate sensitive equipment, such as the boilers, when completing the test.

3.09 Cleaning – Heating Piping

- A. Prior to starting work, verify system is complete, flushed and clean.
- B. Add to the hydronic system one pound of Trisodium Phosphate for each sixty gallons of system capacity.
- C. Boil out system for four hours at a minimum temperature of 195 degrees F.
- D. After boil out, completely drain and flush system including low points.
- E. Clean strainers and remove construction strainers.

- F. Fill system with glycol where indicated.
- G. Test for strength of glycol and water solution and submit written test results.

3.010 Schedules

- A. Adjust hanger spacing based on module roof loading.
- B. Copper and Steel Pipe Hanger Spacing:

PIPE SIZE Inches	COPPER TUBING MAXIMUM HANGER SPACING Feet	STEEL PIPE MAXIMUM HANGER SPACING Feet	COPPER TUBING HANGER ROD DIAMETER Inches	STEEL PIPE HANGER ROD DIAMETER Inches
1/2	5	7	3/8	3/8
3/4	5	7	3/8	3/8
1	6	7	1/2	1/2
1-1/4	7	7	1/2	1/2
1-1/2	8	9	1/2	1/2
2	8	10	1/2	1/2

END OF HVAC PIPING AND PUMPS

SECTION 23 31 00 HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.01 Summary

A. Section Includes:

1. Duct Materials.
2. Ductwork fabrication.
3. Ductwork accessories.

1.02 Performance Requirements

- A. Variation of duct configuration or sizes other than those of equivalent or lower loss coefficient is not permitted except by written permission.

1.03 Submittals

- A. Shop Drawings: Duct fabrication drawings, drawn to scale not smaller than 1/4 inch equals 1 foot, on drawing sheets same size as Contract Documents, indicating:

1. Fabrication, assembly, and installation details, including plans, elevations, sections, details of components, and attachments to other Work.
2. Duct layout, indicating pressure classifications and sizes in plan view. For exhaust duct systems, indicate classification of materials handled as defined in this Section.
3. Fittings.
4. Reinforcing details and spacing.
5. Seam and joint construction details.
6. Hangers and supports, including methods for building attachment, vibration isolation, and duct attachment.

- B. Product Data: Duct materials.

1.04 Closeout Submittals

- A. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.05 Quality Assurance

- A. Perform Work according to SMACNA - HVAC Duct Construction Standards - Metal and flexible.
- B. Construct ductwork to NFPA 90A and NFPA 90B standards.
- C. Passivate stainless steel welds per ASTM A967. Confirm absence of free iron in heat affected zone using ASTM A967, Copper Sulfate Test, Practice C.

1.06 Environmental Requirements

- A. Do not install duct sealant when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures during and after installation of duct sealant.

1.07 Field Measurements

- A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.01 Duct Materials

- A. Galvanized Steel Ducts: ASTM A653/A653M galvanized steel sheet, lock-forming quality, having G90 zinc coating in conformance with ASTM A90/A90M.
- B. Stainless Steel Ducts: ASTM A240, Type 304 or ASTM A666, Type 304L where fabrication is by welding.
- C. Fasteners: Stainless steel bolts, or stainless steel sheet metal screws.
- D. Hanger Rod: ASTM F593; stainless steel, threaded both ends, threaded one end, or continuously threaded. Zinc plated hardware will not be accepted.

2.02 Ductwork Fabrication

A. General:

- 1. Fabricate and support rectangular ducts according to SMACNA HVAC Duct Construction Standards - Metal and Flexible. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- 2. Construct T's, bends, and elbows with minimum radius 1-1/2 times centerline duct width. Where not possible and where rectangular elbows are used, provide turning vanes. Where acoustical lining is indicated, furnish turning vanes of perforated metal with glass fiber insulation.
- 3. Seal joints between duct sections and duct seams with welds, gaskets, mastic adhesives, mastic plus embedded fabric systems, or tape.
 - a. Sealants, Mastics and Tapes: Conform to UL 181A. Provide products bearing appropriate UL 181A markings.
 - b. Do not provide sealing products not bearing UL approval markings.

2.03 Flexible Duct Connections

- A. Fabricate according to SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. Connector: Fabric crimped into metal edging strip.
 - 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric conforming to NFPA 90A, minimum density 30 oz per sq yd.

2. Net Fabric Width: Approximately 4 inches wide.
3. Metal: 3 inch wide, 24 gage galvanized steel.

2.04 Balancing Dampers

- A. Fabricate according to SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch.
 1. Material: Same gage as duct to 24 inches size in both dimensions, and two gages heavier for sizes over 24 inches.
 2. End Bearings: Except in round ductwork 12 inches and smaller, furnish end bearings.
 3. Quadrants:
 - a. Furnish locking, indicating quadrant regulators.
 - b. On insulated ducts mount quadrant regulators on standoff mounting brackets, bases, or adapters.

PART 3 - EXECUTION

3.01 Examination

- A. Verify sizes of equipment connections before fabricating transitions.

3.02 Installation

- A. Install and seal ducts according to SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. During construction, install temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- C. Install duct hangers and supports as required.
- D. Use double nuts and lock washers on threaded rod supports.
- E. Exhaust Outlet Locations:
 1. Minimum Distance from Building Openings: 3 feet.
 2. Minimum Distance from Outside Air Intakes: 10 feet.

END OF HVAC DUCTS AND CASINGS

SECTION 23 34 00

HVAC FANS

PART 1 - GENERAL

1.01 Summary

A. Section Includes:

1. Propeller fans.

1.01 Submittals

- A. Shop Drawings: Indicate size and configuration of fan assembly, mountings, weights, ductwork, and accessory connections.
- B. Product Data: Each type of fan and include accessories, fan curves with specified operating point plotted, power, RPM, sound power levels for both fan inlet and outlet at rated capacity, electrical characteristics and connection requirements.
- C. Manufacturer's Installation Instructions: Fan manufacturer's instructions.
- D. Manufacturer's Certificate: Products meet or exceed specified requirements.

1.01 Quality Assurance

- A. Performance Ratings: Conform to AMCA 210 and bear AMCA Certified Rating Seal.
- B. Sound Ratings: AMCA 301, tested to AMCA 300, and bear AMCA Certified Sound Rating Seal.
- C. UL Compliance: UL listed and labeled, designed, manufactured, and tested according to UL 705.
- D. Balance Quality: Conform to AMCA 204.
- E. Manufacturer: Company specializing in manufacturing products specified in this Section with three years' experience.

1.01 Delivery, Storage, And Handling

- A. Protect motors, shafts, and bearings from weather and construction dust.

1.01 Field Measurements

- A. Verify field measurements prior to fabrication and indicate on Shop Drawings.

PART 2 - PRODUCTS

1.01 Propeller Fans

A. Construction:

1. Impeller: Shaped steel or steel reinforced aluminum blade with hubs, statically and dynamically balanced, locked to shaft, directly connected to motor or furnished with V-belt drive.
2. Frame: One piece, square steel with die-formed venturi orifice, mounting flanges and supports, with baked enamel finish.

3. Where noted on the schedule, fans shall be AMCA Class C spark resistant construction.

B. Accessories:

1. Safety Screens: Expanded galvanized metal over inlet, motor, and drive; to comply with OSHA regulations.
2. Electrical Accessories: When noted on the schedule, junction boxes, thermostats, and enclosures shall be suitable for Class 1 Division 2, Groups C & D.
3. Motors: According to Section 23 05 13. Type: TEFC NEMA MG1. Where noted on the schedule, motors shall be explosion proof Class 1 Division 2, Group C & D listed.
4. Disconnect Switch: Factory mount on equipment.
5. Backdraft Damper: Extruded aluminum frame with screwed corners. Horizontal blade orientation with vinyl blade seals.

PART 3 - EXECUTION

1.01 Installation

- A. Secure wall fans with cadmium plated steel lag screws to structure.
- B. Install safety screen where inlet or outlet is exposed.

1.01 Cleaning

- A. Vacuum clean inside of fan cabinet.

1.01 Demonstration

- A. Demonstrate fan operation and maintenance procedures.

1.01 Protection Of Finished Work

- A. Do not operate fans until ductwork is clean, filters in place, bearings lubricated, and fan has been test run under observation.

END OF HVAC FANS

SECTION 23 52 23 CAST IRON BOILERS & ACCESSORIES

PART 1 - GENERAL

1.01 Summary

A. Section Includes:

1. Cast-iron boilers.
2. Boiler controls.
3. Fuel oil fired burner.
4. Breeching and chimneys.

1.02 Submittals

- A. Product Data: Capacities and accessories included with boiler. Include general layout, dimensions, size and location of water, fuel, electric and vent connections, electrical characteristics, weight and mounting loads.
- B. Test Reports: Indicate boilers meet or exceed specified performance and efficiency. Submit results of combustion test.
- C. Manufacturer's Installation Instructions: Assembly, support details, connection requirements, and include start-up instructions.
- D. Manufacturers Field Reports: Indicate condition of equipment after start-up including control settings and performance chart of control system.

1.03 Closeout Submittals

- A. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, cleaning procedures, replacement parts list, and maintenance and repair data.
- B. Provide combustion test results of final installation.

1.04 Quality Assurance

- A. Conform to ASME Section IV and UL 726 for construction of boilers. Provide boilers registered with National Board of Boiler and Pressure Vessel Inspectors.
- B. Unit Certification: UL certified.
- C. Conform to applicable code for internal wiring of factory-wired equipment.
- D. Products Requiring Electrical Connection: Listed and classified by testing firm acceptable to authority having jurisdiction as suitable for purpose specified and indicated.
- E. Manufacturer: Company specializing in manufacturing products specified in this Section with ten years' experience, and with service facilities within the State of Alaska.

- F. Installer: Company specializing in performing Work of this Section with three years' experience.

1.05 Field Measurements

- A. Verify field measurements prior to fabrication and indicate on Shop Drawings.

PART 2 - PRODUCTS

2.01 Cast-Iron Boilers

A. Manufacturers:

1. Weil McLain
2. Burnham
3. DeDietrich
4. Substitutions: Permitted.

- B. Product Description: Cast-iron boilers with natural draft, insulated jacket, sectional cast iron heat exchanger, fuel oil burning system, refractory, controls and boiler trim.

- C. Furnish water wall design consisting of water backed combustion area with water circulating around firebox. Refractory chamber or separate base not required.

D. Boiler Fabrication:

1. Assembly:
 - a. Cast iron sections.
 - b. ASME Section IV rating.
 - c. Factory assembled with push nipples or gaskets and draw rods.
 - d. Manufacturer's steel skid.
 - e. Fire Tested prior to shipping from the factory.
2. Furnish access for flue passages for cleaning and flame observation ports.
3. Jacket: Glass fiber insulated steel jacket, finished with factory applied baked enamel.

E. Boiler Fuel Burning System:

1. Burner Operation: ON - OFF with low fire position for ignition.
2. Oil Burner: High pressure atomizing type for No. 2 fuel oil with combustion air blower, fuel pump, hinged flame inspection port, cadmium sulfide flame sensor, electrodes, ignition transformer, and oil nozzle, fuel filter.
3. Oil Burner Safety Controls: Energize burner motor and electric ignition, limit time for establishment of main flame, monitor flame continuously during burner operation and stop burner on flame failure with manual reset

necessary, solenoid oil delay valve opens after burner motor energized and closes when de-energized.

4. Controls: Pre-wired, factory assembled electronic controls in control cabinet with flame scanner or detector, programming control, relays, and switches. Furnish pre-purge and post-purge ignition and shut down of burner in event of ignition pilot and main flame failure with manual reset.

F. Boiler Performance: As scheduled on the drawings.

2.02 Breeching

A. Fabricate of ASTM A569 carbon steel. Weld longitudinal seams. Fabricate joints by welding, lapping and bolting, or with companion flanges.

2.03 Double Wall Metal Stacks

A. Manufacturers:

1. Selkirk Corporation, Ultra-Temp HT
2. Substitutions: Permitted.

B. Tested and UL listed to UL103HT.

C. One inch insulation between walls:

1. Inner Jacket: Type 304 stainless steel.
2. Outer Jacket: Type 304 stainless steel.

D. Clearance from combustibles: 2 inches.

E. Accessories:

1. Note drawings for all accessories.
2. Barometric damper.
3. Famco, stainless steel wind directional cap.

PART 3 - EXECUTION

3.01 Installation

A. Provide factory assembled boiler. Perform pressure test on boiler after installation according to following:

1. Pressure test before connecting fuel oil piping, electrical connections, and controls.
2. Install boiler drain and pressure gage.
3. Plug remaining openings.
4. Fill boiler with water and vent air.
5. Pressure test to 1-1/2 times working pressure for 10 minutes with no leaks.

6. Repair leaks and retest.
 7. After successful test, drain and remove plugs from openings to be used for piping connections and controls.
- B. Install boilers plumb and level, to plus or minus 1/16 inch over boiler base.
 - C. Maintain manufacturer's recommended clearances around and over boilers.
 - D. Lag bolt boiler skid securely to structural floor members. Provide attachments in accordance with the seismic restraint specification Section 01 88 15.
 - E. Connect fuel oil piping according to NFPA 31.
 - F. Connect fuel oil piping to boiler. Arrange piping with clearances for burner removal and service.
 - G. Connect hot water piping to supply and return boiler connections.
 - H. Install discharge piping from relief valves full size of valve outlet routed to glycol mix tank with a maximum of 4 elbows and pitched down to outlet. Install hose thread adapter and cap on drain valves.
 - I. Install boiler trim and accessories furnished loose for field mounting.
 - J. Install electrical devices furnished loose for field mounting.
 - K. Coordinate wiring with emergency boiler shut-off switches.
 - L. Install control wiring between boiler control panel and field mounted control devices.
 - M. Connect flue to boiler outlet, full size of outlet.

3.02 Field Quality Control

- A. Perform combustion test including boiler firing rate, over fire draft, gas flow rate, heat input, burner manifold gas pressure, percent carbon monoxide, percent oxygen, percent excess air, flue gas temperature at outlet, ambient temperature, net stack temperature, percent stack loss, percent combustion efficiency, and heat output. Perform test at minimum, and high fire.
- B. Arrange with local authorities having jurisdiction for inspection of boiler, piping, and for certificate of operation.

3.03 Manufacturer's Field Service

- A. Start-up boilers according to manufacturer's start-up instructions and in presence of boiler manufacturer's representative or factory trained personnel.
- B. Test controls and demonstrate compliance with requirements.
- C. Replace damaged or malfunctioning controls and equipment.

3.04 Adjusting

- A. Complete combustion testing and adjust burner for maximum burning efficiency.

1. Combustion tests and adjustments to be completed at final installation location.

B. Submit combustion test results with Close-Out Documents.

3.05 Cleaning

- A. Flush and clean boilers upon completion of installation, according to manufacturer's start-up instructions.

3.06 Demonstration

- A. Demonstrate operation and maintenance procedures.
- B. Furnish services for manufacturer's technical representative for one day to instruct Owner's personnel in operation and maintenance of boilers. Schedule training with Owner, and provide at least seven days' notice to Engineer of training date.

END OF CAST-IRON BOILERS & ACCESSORIES

SECTION 23 82 00

HYDRONIC TERMINAL HEATING UNITS

PART 1 - GENERAL

1.01 Summary

- A. Section Includes:
 - 1. Unit heaters.
 - 2. Corrosion-Resistant Unit Heaters

1.02 Submittals

- A. Product Data: Submit schedules for equipment and radiation enclosures indicating length and number of pieces of element and enclosure, corner pieces, end caps, cap strips, access doors, pilaster covers, and comparison of specified heat required to actual heat output of equipment.

1.03 Closeout Submittals

- A. Operation and Maintenance Data: Submit operating instructions, maintenance and repair data, and parts lists.

1.04 Quality Assurance

- A. Perform Work in accordance with State of Alaska standards.
- B. Maintain one copy of each document on site.

PART 2 - PRODUCTS

2.01 Unit Heater Standard

- A. Manufacturers:
 - 1. Airtex
 - 2. Engineered Air
 - 3. Modine
 - 4. Substitutions: Permitted.

- B. Casing: 18 gauge steel with electrostatically applied powder coat or baked enamel finish, threaded pipe connections for hanger rods.
- C. Coils: Seamless copper tubing, 0.025 inch minimum wall thickness, and with evenly spaced aluminum fins mechanically bonded to tubing.
- D. Fan: Direct drive propeller type with aluminum blades and fan guard.
- E. Air Outlet: Louvers for vertical adjustment of air discharge.
- F. Motor: Totally enclosed, resiliently mounted, with permanently lubricated sleeve bearings. 120V single phase, 60 Hz.
- G. Thermostat: 120 volt, surface mount outlet box, 50 to 90 degrees F range

2.02 Unit Heater – Corrosion Resistant

- A. Manufacturers:
 - 1. Hazloc Heaters
 - 2. Substitutions: Permitted.
- B. Casing: 14 gauge steel with factory applied Heresite coating.
- C. Coils: 16 gauge carbon-steel tubes with tension wound aluminum fins and carbon steel headers. Factory applied heresite coating to coils.
- D. Fan: Direct drive propeller type with aluminum blades and fan guard.
- E. Air Outlet: Louvers for vertical adjustment of air discharge.
- F. Motor: Totally enclosed, resiliently mounted, with permanently lubricated sleeve bearings. 120V single phase, 60 Hz.
- G. Thermostat: 120 volt, surface mount outlet box, 50 to 90 degrees F range

PART 3 - EXECUTION

3.01 Examination

- A. Verify wall and ceiling construction are ready for installation.
- B. Verify concealed blocking and supports are in place and connections are correctly located.

3.02 Installation

- A. Install Work in accordance with State of Alaska standards.
- B. Install equipment in accordance with manufacturer's recommended installation guidelines.
- C. Install radiation on outside walls and install cover as indicated on Drawings.
 - 1. Fasten back plate to wall maximum 24 inches on center. Provide additional backing as required.

- D. Install unit heaters from building structure. Support independently from piping. Mount minimum 7 feet above floor. Provide seismic bracing.
- E. Touch-up marred or scratched surfaces of factory-finished cabinets, using finish materials furnished by manufacturer.

END OF HYDRONIC TERMINAL HEATING UNITS

SECTION 26 00 00 ELECTRICAL WORK, GENERAL

PART 1 - GENERAL

1.01 The Requirement

- A. The CONTRACTOR shall provide electrical work, complete and operable, in accordance with the Contract Documents.
- B. The provisions of this Section apply to all sections in Division 26 and Division 40, except as indicated otherwise.
- C. The WORK of this Section is required for operation of electrically-driven equipment provided under specifications in other Divisions. The CONTRACTOR's attention is directed to the requirement for proper coordination of the WORK of this Section with the WORK of equipment specifications, and the WORK of instrumentation sections.
- D. Concrete, excavation, backfill, and steel reinforcement required for encasement, installation, or construction of the WORK of the various sections of Division 26 is included as a part of the WORK under the respective sections, including duct banks, manholes, handholes, equipment housekeeping pads, and light pole bases.
- E. The CONTRACTOR shall coordinate with the OWNER and serving utility as necessary for all work to be done in modification of the existing electrical service. The CONTRACTOR shall coordinate with United Utilities, Inc., for disconnection and reconnection of electrical service; application and permit requirements are part of the WORK.
- F. All required utility fees shall be paid for by the CONTRACTOR including connect/disconnect fees and new service charges. Contract adjustment will be made based on actual charges.

1.02 Reference Standards

- A. The WORK of this Section and all sections in Division 26 shall comply with the following, as applicable:

NEC (NFPA 70)	National Electrical Code – latest adopted version
NETA	International Electrical Testing Association
NEMA 250	Enclosure for Electrical Equipment (1000 Volts Maximum)
ANSI	American National Standards Institute
UL	Underwriters Laboratories (UL-508A or 913 for intrinsically safe)

- B. All electrical equipment shall be listed by and shall bear the label of Underwriters' Laboratories, Inc. (UL) or other State of Alaska recognized testing laboratory.
- C. Installation of electrical equipment and materials shall comply with OSHA Safety and Health Standards, state building standards, and applicable local codes and regulations.
- D. Where the requirements of the specifications conflict with UL, NEMA, NFPA, or other applicable standards, the more stringent requirements shall govern.

1.03 Signage

- A. Local Disconnect Switches:
 - 1. Each local disconnect switch for motors and equipment shall be legibly marked to indicate its purpose, unless the purpose is indicated by the location and arrangement.
- B. Isolating Switches: Isolating switches not interlocked with an approved circuit interrupting device shall be provided with a sign warning against opening them under load.

1.04 Public Utilities Requirements

- A. The Public Electrical Utility associated with this project is Alaska Village Electric Cooperative (AVEC). The CONTRACTOR shall coordinate all requirements with the Utility as required.
- B. The CONTRACTOR shall contact the serving utility and verify compliance with requirements before construction. The CONTRACTOR shall coordinate schedules and payments for work by all utilities.
- C. Electrical service shall be as indicated and be as required by the serving utility.
- D. The CONTRACTOR shall verify and provide all service conduits, fittings, grounding devices, and all service wires not provided by the serving utility.
- E. The CONTRACTOR shall verify with the utility the exact location of each service point, type of service, and shall pay all charges levied by the serving utilities as part of the WORK.

1.05 Permits And Inspection

- A. All electrical permits shall be obtained and inspection fees shall be paid by the CONTRACTOR.
- B. The CONTRACTOR shall pay all electrical utility line extension, service upgrade, equipment, connection and turn-on service charges required by the utility company.

1.06 Contractor Submittals

- A. Furnish submittals in accordance with Section 01 33 00 Submittals Procedure.
- B. Shop Drawings: Include the following:

1. Complete material lists stating manufacturer and brand name of each item or class of material.
 2. Shop Drawings for all grounding WORK not specifically indicated.
 3. Front, side, rear elevations, and top views with dimensional data.
 4. Location of conduit entrances and access plates.
 5. Component data.
 6. Connection diagrams, terminal numbers, internal wiring diagrams, conductor size, and cable numbers.
 7. Method of anchoring, seismic requirements, weight.
 8. Types of materials and finish.
 9. Nameplates.
 10. Temperature limitations, as applicable.
 11. Voltage requirement, phase, and current, as applicable.
 12. Front and rear access requirements.
 13. Test reports.
 14. Grounding requirements.
- C. Catalog cuts of applicable pages of bulletins or brochures for mass produced, non-custom manufactured material. Catalog data sheets shall be stamped to indicate the project name, applicable Section and paragraph; and shall be clearly marked to indicate exact model number, and options being provided.
- D. Shop Drawings shall be custom prepared. Drawings or data indicating "optional" or "as required" equipment are not acceptable. Options not proposed shall be crossed out or deleted from Shop Drawings.
- E. Materials and Equipment Schedules: The CONTRACTOR shall deliver to the ENGINEER within 30 days of the commencement date in the Notice to Proceed, a complete list of all materials, equipment, apparatus, and fixtures proposed for use. The list shall include type, sizes, names of manufacturers, catalog numbers, and other such information required to identify the items.
- F. Owner's Manuals: Complete information in accordance with Section 01 33 00.
- G. Record Drawings: The CONTRACTOR shall show invert and top elevations and routing of all duct banks and concealed below-grade electrical installations. Record Drawings shall be prepared, be available to the ENGINEER, and be submitted according to Section 01 33 00.

1.07 Area Designations

- A. General:
1. Raceway system enclosures shall comply with Section 26 05 33 – Electrical Raceway Systems.

2. Electrical WORK specifically indicated in sections within any of the Specifications shall comply with those requirements.
3. Electrical WORK in above ground indoor areas shall be NEMA 1 unless otherwise indicated.
4. Electrical WORK in damp or wet locations shall be NEMA 3R unless otherwise indicated.
5. Electrical WORK in below ground facilities and outdoors shall be NEMA 4X unless otherwise indicated.
6. Installations in hazardous locations shall conform strictly to the requirements of the Class, Group, and Division required.

B. Material Requirements:

1. NEMA 4X enclosures shall be stainless steel, Type 304 or 316.

1.08 TESTS

- A. The CONTRACTOR shall be responsible for factory and field tests required by specifications in Division 26 and by the ENGINEER or authority having jurisdiction. The CONTRACTOR shall furnish necessary testing equipment and pay costs of tests, including all replacement parts and labor, due to damage resulting from damaged equipment or from testing and correction of faulty installation.
- B. Where test reports are indicated, proof of design test reports for mass-produced equipment shall be submitted with the Shop Drawings, and factory performance test reports for custom-manufactured equipment shall be submitted and be approved prior to shipment. Field test reports shall be submitted for review prior to Substantial Completion.
- C. Equipment or material which fails a test shall be removed and replaced.
- D. Cable Testing: Cables and conductors shall be tested in accordance with Section 26 05 19.
- E. Test Ground Fault Interrupter (GFI) receptacles and circuit breakers for proper operation by methods sanctioned by the receptacle manufacturer.
- F. A functional test and check of all electrical components is required prior to performing subsystem testing and commissioning. Compartments and equipment shall be cleaned as required by other provisions of these Specifications before commencement of functional testing. Functional testing shall comprise:
 1. Visual and physical check of cables, circuit breakers, transformers and connections associated with each item of new and modified equipment.
 2. Circuit breakers that have adjustable time or pick-up settings for ground current, instantaneous overcurrent, short-time overcurrent, or long-time overcurrent, shall be field-adjusted by a representative of the circuit breaker manufacturer. Setting shall be tabulated and proven for each

circuit breaker in its installed position. Test results shall be certified by the person performing the tests and be transmitted to the ENGINEER.

- G. Complete ground testing of grounding electrodes per requirements prior to operating the equipment.
- H. Subsystem testing shall occur after the proper operation of alarm and status contacts has been demonstrated or otherwise accepted by the ENGINEER and after process control devices have been adjusted as accurately as possible. It is intended that the CONTRACTOR will adjust instruments to their operating points prior to testing and will set pressure switches, flow switches, and timing relays as dictated by operating results.
- I. After initial settings have been completed, each subsystem shall be operated in the manual mode and it shall be demonstrated that operation is in compliance with the Contract Documents. Once the manual mode of operation has been proven, automatic operation shall be demonstrated through coordination with the Owner to verify such items as proper start and stop sequence of pumps, proper operation of valves, proper speed control, etc.

1.09 Demolition And Related Work

- A. The CONTRACTOR shall perform electrical demolition WORK as indicated on the electrical drawings and in parts of this Specification Section. The CONTRACTOR is cautioned that demolition WORK may also be indicated on non-electrical drawings and other Specification Sections. Coordinate electrical de-energization, disconnection, and removal with all trades and the overall sequence of construction.

1.010 Construction Sequencing

- A. The CONTRACTOR shall carefully examine all work to be done in, on, or adjacent to existing equipment. Work shall be scheduled, subject to the OWNER's approval, to minimize equipment shutdown time. The CONTRACTOR shall submit a written request including sequence and duration of activities to be performed prior to any facility shutdown.
- B. All switching, safety tagging, etc., required for process or equipment shutdown or to isolate existing equipment shall be performed by the CONTRACTOR. In no case shall the CONTRACTOR begin any work in, on, or adjacent to existing facility without written authorization by the OWNER or the ENGINEER.
- C. Extreme caution shall be exercised by the CONTRACTOR in order not to damage existing utilities. Cost of repairs of damages caused during construction shall be the CONTRACTOR's responsibility without any additional compensation from the OWNER.

1.011 Installation Of New Equipment:

- A. The CONTRACTOR will install and terminate the new panelboards, control panels, junction boxes, conduits, cables, and instruments, etc. in accordance with the agreed schedule. The CONTRACTOR shall provide a list, daily, of the points that are ready for service as they are connected, calibrated, and tested. The CONTRACTOR shall only connect to equipment that is new or is out of service, unless otherwise directed by the ENGINEER or OWNER.

PART 2 - PRODUCTS

2.01 General

- A. Equipment and materials shall be new, shall be listed by UL, and shall bear the UL label where UL requirements apply; other Nationally Recognized Testing Agencies recognized by state of Alaska Mechanical Inspections Division will be considered equivalent to UL. Equipment and materials shall be the products of experienced and reputable manufacturers in the industry. Similar items in the WORK shall be products of the same manufacturer. Equipment and materials shall be of industrial grade standard of construction.
- B. Where a NEMA enclosure type is indicated in a non-hazardous location, the CONTRACTOR shall utilize that type of enclosure, despite the fact that certain modifications, such as cutouts for control devices, may negate the NEMA rating.
- C. On devices indicated to display dates, the year shall be displayed as 4 digits.

2.02 Mounting Hardware

- A. Miscellaneous Hardware:
 - 1. Hot-dipped galvanized nuts, bolts and washers may be used with galvanized rigid conduit (GRC) and enclosures.
 - 2. Hot-dipped galvanized hardware may be used with GRC.
 - 3. Strut for mounting of raceways and equipment shall be galvanized or stainless steel as required by the area classification. Where contact with concrete or dissimilar metals may cause galvanic corrosion, suitable non-metallic insulators shall be utilized to prevent such corrosion. Strut shall be as manufactured by Unistrut, B-Line, or equal.
 - 4. Anchors for attaching equipment to concrete walls, floors and ceilings shall be stainless steel expansion anchors, such as "Rawl-Bolt," "Rawl-Stud" or "Lok-Bolt" as manufactured by Rawl; similar by Star, or equal. Wood plugs shall not be used.

2.03 Electrical Identification

- A. Nameplates: Nameplates shall be fabricated from white-letter, black-face laminated plastic engraving stock, Formica type ES-1, or equal. Each shall be fastened securely, using fasteners of brass, cadmium-plated steel, or stainless steel, screwed into inserts or tapped holes, as required. Engraved characters shall

be block style, with no characters smaller than 1/8-inch in height, unless otherwise noted.

- B. Conductor and Equipment Identification: Conductor and equipment identification devices shall be heat-shrink plastic tubing with machine printing. Lettering shall read from left to right and shall face toward the front of the panel.

PART 3 - EXECUTION

3.01 General

- A. Incidentals: The CONTRACTOR shall provide all materials and incidentals required for a complete and operable system, even if not required explicitly by the contract documents. Typical incidentals are terminal lugs not furnished with vendor-supplied equipment, compression connectors for cables, splices, junction and terminal boxes, and control wiring required by vendor-furnished equipment to connect with other equipment indicated in the Contract Documents.
- B. Field Control of Location and Arrangement: The Drawings diagrammatically indicate the desired location and arrangement of outlets, conduit runs, equipment, and other items. Exact locations shall be determined by the CONTRACTOR in the field, based on the physical size and arrangement of equipment, finished elevations, and other obstructions. Locations on the Drawings, however, shall be followed as closely as possible.
 - 1. Where raceway development drawings, or "home runs," are shown, the CONTRACTOR shall route the raceways in accordance with the indicated installation requirements.
 - 2. Conduit and equipment shall be installed in such a manner as to avoid all obstructions and to preserve headroom and keep openings and passageways clear. Lighting fixtures, switches, convenience outlets, and similar items shall be located within finished rooms as indicated. Where the Drawings do not indicate exact locations, the ENGINEER shall determine such locations. If equipment is installed without instruction and must be moved, it shall be moved without additional cost to the OWNER. Lighting fixture locations shall be adjusted slightly to avoid obstructions and to minimize shadows.
 - 3. Wherever raceways and wiring for lighting and receptacles are not indicated, it shall be the CONTRACTOR's responsibility to provide all lighting and receptacle-related conduits and wiring as required, based on the actual installed fixture layout and the circuit designations as indicated. Wiring shall be #12 AWG minimum, and conduits shall be 3/4-inch minimum, unless otherwise indicated. Where circuits are combined in the same raceway, the CONTRACTOR shall de-rate conductor ampacities in accordance with NEC requirements.
- C. Workmanship: Materials and equipment shall be installed in strict accordance with printed recommendations of the manufacturer. Installation shall be

accomplished by workers skilled in the work. Installation shall be coordinated in the field with other trades to avoid interferences.

- D. Protection of Equipment and Materials: The CONTRACTOR shall fully protect materials and equipment against damage from any cause. Materials and equipment, both in storage and during construction, shall be covered in such a manner that no finished surfaces will be damaged, marred, or splattered with water, foam, plaster, or paint. Moving parts shall be kept clean and dry. The CONTRACTOR shall replace or refinish damaged materials or equipment, including faceplates of panels and switchboard sections, as part of the WORK.
- E. Incoming utility power equipment shall be provided in conformance with the utility's requirements.

3.02 Core Drilling

- A. The CONTRACTOR shall perform core drilling required for installation of raceways through concrete walls, floors and handholes. Locations of floor penetrations, as may be required, shall be based on field conditions. Verify all exact core drilling locations based on equipment actually furnished, as well as exact field placement. To the extent possible, identify the existence and locations of encased raceways and other piping in existing walls and floors with the OWNER prior to any core drilling activities. Damage to any encased conduits, wiring, and piping shall be repaired as part of the WORK.
- B. All penetrations required to extend raceways through concrete walls, roofs, and floors or masonry walls shall be core drilled.

3.03 Equipment Anchoring

- A. Floor supported, wall-, or ceiling-hung equipment and conductors shall be anchored in place by methods that will meet seismic requirements in the area where the project is located. Wall-mounted panels that weigh more than 500 pounds, or which are within 18 inches of the floor, shall be provided with fabricated steel (stainless steel in designated areas) support pedestals. If the supported equipment is a panel or cabinet enclosed within removable side plates, it shall match supported equipment in physical appearance and dimensions. Transformers hung from 4-inch stud walls and weighing more than 300 pounds shall have auxiliary floor supports.
- B. Anchoring methods and leveling criteria in the printed recommendations of the equipment manufacturers are a part of the WORK of this Contract. Such recommendations shall be submitted as Shop Drawings under Section 01 33 00.
- C. Panels, raceways, and other equipment shall be anchored and supported for Seismic requirements.

3.04 Equipment Identification

- A. General: Equipment and devices shall be identified as follows:

1. Nameplates shall be provided for all switchboards, panelboards, control and instrumentation panels, starters, switches, and pushbutton stations. In addition to nameplates, control devices shall be equipped with standard collar-type legend plates.
2. Control devices within enclosures shall be identified as indicated. Identification shall be similar to the subparagraph above.
3. Equipment names and tag numbers, where indicated on the Drawings, shall be utilized on all nameplates.
4. The CONTRACTOR shall furnish typewritten circuit directories for panelboards; circuit directory shall accurately reflect the equipment connected to each circuit.

3.05 Cleaning

- A. Before final acceptance, the electrical WORK shall be thoroughly cleaned. Exposed parts shall be thoroughly clean of cement, plaster, and other materials. Oil and grease spots shall be removed with a non-flammable cleaning solvent. Such surfaces shall be carefully wiped and all cracks and corners cleaned out. Touch-up paint shall be applied to scratches on panels and cabinets. Electrical cabinets or enclosures shall be vacuum-cleaned.
- B. CONTRACTOR shall group, coil, and tie wrap all spare cables at the bottom of the Local Control Panels. The wires shall be grouped according to the device, control panel, or MCC section they originate from. Cable groups shall be tagged according to their point of origin.
- C. All debris shall be removed from the void below the panels.

END OF ELECTRICAL WORK, GENERAL

SECTION 26 05 19 WIRE AND CABLES

PART 1 -- GENERAL

1.01 The Requirement

- A. The CONTRACTOR shall provide wires and cable, complete and operable, in accordance with the Contract Documents.

1.02 Contractor Submittals

- A. The CONTRACTOR shall submit Shop Drawings in accordance with Section 01 33 00 and 26 00 00 – Electrical Work, General.

PART 2 -- PRODUCTS

2.01 General

- A. Conductors, including grounding conductors, shall be copper. Aluminum conductor wire and cable will not be permitted. Insulation shall bear the label of Underwriters' Laboratories, Inc. (UL), the manufacturer's trademark, and identify the type, voltage, and conductor size. All conductors except flexible cords and cables, fixture wires, and conductors that form an integral part of equipment, such as motors and controllers, shall conform to the requirements of Article 310 of the National Electrical Code, latest edition, for current carrying capacity. Flexible cords and cables shall conform to Article 400, and fixture wires shall conform to Article 402. Wiring shall have wire markers at each end.

2.02 Low Voltage Wire And Cable

A. Power and Lighting Wire

1. Power and lighting wire shall be No. 12 copper AWG minimum size.
2. Wire rated for 600 volts in duct or conduit for all power shall be:
 - a. In above grade interior locations: Type THWN-2
 - b. In exterior, underground, and below grade installations: Type XHHW-2
3. Wiring for 600 volt class power and lighting shall be as manufactured by General Cable, Okonite, Rome Cable or equal.

B. Control Wire

1. Control wire in duct or conduit shall be the same type as power and lighting wire indicated above.
2. Control wiring shall be: No.14, 19-strand copper AWG.

C. Instrumentation Cable

1. Instrumentation cable shall be rated at 600 volts.
 2. Individual conductors shall be No. 18 AWG stranded, tinned copper. Insulation shall be color-coded polyethylene: black-red for two-conductor cable, and black-red-white for three-conductor cable.
 3. Instrumentation cables shall be composed of the individual conductors, an aluminum polyester foil shield, a No. 18 AWG stranded, tinned copper drain wire, and a PVC outer jacket with a thickness of 0.048-inches.
 4. Single pair, No. 18 AWG, twisted, shielded cable shall be Belden Part No. 9341, or equal.
 5. Single triad, No. 16 AWG, twisted, shielded cable shall be Belden Part No. 1119A, or equal.
- D. Multi-pair Control Cable – Multi-pair control cable shall be 6-pair, 600V, No. 16 AWG, twisted, shielded, direct burial rated Belden Part No. 1040A, or equal.
- E. Cat 6 Cable: Cat 6 patch cable shall be 4-pair 24-gauge twisted pair rated to TIA/EIA 568-C.2 Category 6 and UL-listed. The CONTRACTOR shall install RJ-45 connectors as required.
- F. Fire Alarm Cable: Fire Alarm Cable shall be as recommended by the Fire Alarm Control Panel manufacturer or the Fire Alarm Device manufacturer.

2.03 Cable Terminations

- A. Pre-insulated, pressure type, twist-on connectors for conductors #10 AWG and smaller shall be 3M Company "Scotchlok" or Ideal Industries, Inc. "Super Nut" or equal.
- B. Compression connectors shall be Burndy "Hi Lug", Thomas & Betts "Sta-Kon," or equal. Threaded connectors shall be split bolt type of high strength copper alloy.
- C. Pre-insulated fork tongue lugs shall be Thomas & Betts, Burndy, or equal.
- D. General purpose insulating tape shall be Scotch No. 33, Plymouth "Slip-knot," or equal. High temperature tape shall be polyvinyl as manufactured by Plymouth, 3M, or equal.
- E. Labels for coding 600-volt wiring shall be heat-shrink plastic tubing type with machine print. Lettering shall read from left to right and face the front of the panel. Field wires terminating at a Control Panel shall be labeled with the wire number shown on the Control Panel wiring diagrams. The CONTRACTOR shall mark all as-built drawings with wire labels.

PART 3 -- EXECUTION

3.01 General

- A. The CONTRACTOR shall provide and terminate all power, control, and instrumentation conductors, except where indicated.

3.02 Installation

- A. Conductors for feeders as defined in Article 100 of the NEC shall be sized to prevent a voltage drop exceeding 2 percent at the farthest point of power distribution, and where the maximum total voltage drop on both feeders and branch circuits to the farthest connected load does not exceed 5 percent.
- B. Conductors for branch circuits as defined in Article 100 of the NEC, shall be sized to prevent a voltage drop exceeding 3 percent at the farthest connected load or combinations of such loads, and where the maximum total voltage drop on both feeders and branch circuits to the farthest connected load does not exceed 5 percent.
- C. Conductors shall not be pulled into raceway until raceway has been cleared of moisture and debris.
- D. Pulling tensions on raceway cables shall be within the limits recommended by the cable manufacturer. Wire pulling lubricant, where needed, shall be UL-approved for the cables/wires being pulled.
- E. The following wiring shall be run in separate raceways:
 - 1. 24 VDC discrete signal and instrument power supply.
 - 2. 4-20 mA analog signal.
 - 3. All AC circuits.
 - 4. Intrinsically safe circuits.
 - 5. Fire alarm signaling line circuits
- F. Wire in panels, cabinets, and wireways shall be neatly grouped using nylon tie straps and shall be fanned out to terminals.

3.03 Splices And Terminations

- A. General
 - 1. No splicing or taps will be permitted in either feeder or branch circuits except at outlet or accessible junction boxes. Utilize compression type solderless connectors when making splices or taps in conductors # 8 AWG or larger. Utilize pre-insulated connectors, 3M Company "Scotchlok" or Ideal Industries, Inc. "Super Nut" for splices and taps in conductors # 10 AWG and smaller. Tape all splices and joints with Scotch #88 plastic tape to secure insulation strength equal to that of the conductors joined.
 - 2. There shall be no cable splices in underground conduits, manholes or pullboxes.
 - 3. Stranded conductors shall be terminated directly on equipment box lugs, making sure that all conductor strands are confined within the lug. Use forked-tongue lugs where equipment box lugs have not been provided.

4. Excess control and instrumentation wire shall be properly taped and terminated as spares.
 - B. Control Wire and Cable
 1. Control conductors shall be spliced or terminated only on terminal strips in panels or vendor-furnished equipment.
 2. In terminal cabinets, junction boxes, motor control centers, and control panels, control wire and spare wire shall be terminated to terminal strips.
 - C. Instrumentation Wire and Cable
 1. Shielded instrumentation cables shall be grounded at one end only, the receiving end (i.e., in the control panel) on a 4-20 mA system.
 - D. Power Wire and Cable
 1. No branch circuit conductors may be spliced unless the CONTRACTOR can convince the ENGINEER that they are essential, and the ENGINEER gives written permission.
- 3.04 Cable Identification
- A. General: Wires and cables shall be identified for proper control of circuits and equipment and to reduce maintenance effort.
 - B. Identification Numbers: The CONTRACTOR shall assign to each control and instrumentation wire and cable a unique identification number. Numbers shall be assigned to all conductors having common terminals and shall be shown on "as built" drawings. Identification numbers shall appear within 3 inches of conductor terminals. "Control Conductor" shall be defined as any conductor used for alarm, annunciator, or signal purposes.
 1. Multiconductor cable:
 - a. Assign a number that shall be attached to the cable at intermediate pull boxes and at stub-up locations beneath freestanding equipment.
 - b. Cable number shall form a part of the individual wire number.
 - c. Individual control conductors and instrumentation cable shall be identified at pull points as described above.
 - d. The instrumentation cable numbers shall incorporate the loop numbers assigned in the Contract Documents.
 2. All 120/240-volt system feeder cables and branch circuit conductors shall be color-coded as follows:
 3. The 120/240-volt system conductors shall be color-coded as follows:
 - a. Line 1 - Black
 - b. Line 2 - Red

- c. Neutral - White
- 4. Color-coding tape shall be used where colored insulation is not available.
 - a. Branch circuit switch leg shall be Yellow.
 - b. Insulated ground wire shall be Green.
 - c. Neutral shall be White or Gray as indicated above.
- 5. Color coding and phasing shall be consistent throughout the Site, bus bars at panelboards, switchboards, and motor control centers shall be connected Phase A-B-C, top to bottom, or left to right, facing connecting lugs.
- 6. General purpose AC control cables shall be Red.
- 7. General purpose DC control cables shall be Blue.
- 8. Spare cable shall be terminated on terminal screws and shall be identified with a unique number as well as with destination.
- 9. Terminal strips shall be identified by computer-printable, cloth, self-sticking marker strips attached under the terminal strip.

3.05 Testing

- A. Cable Assembly and Testing: Cable assembly and testing shall comply with applicable requirements of ICEA Publication No. S-68-516 - Ethylene-Propylene-Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy. Factory test results shall be submitted in accordance with Section 013000 – Contractor Submittals, prior to shipment of cable. The following field tests shall be the minimum requirements:
 - 1. Power cable rated at 600 volts shall be tested with a 1000-volt megohm meter for insulation resistance between phases and from each phase to a ground using a megohmmeter. Tests shall be performed on all feeders as well as branch circuits serving motors or major pieces of equipment.
 - 2. Field testing shall be done after cables are installed in the raceways.
 - 3. Field tests shall be performed by a certified test organization acceptable to the cable manufacturer. Test results shall be submitted to the ENGINEER for review and acceptance.
 - 4. Cables showing less than 100 megohm resistance shall be replaced with a new cable or be repaired. Repair methods shall be as recommended by the cable manufacturer and shall be performed by persons certified by the industry.
- B. Continuity Test: Control and instrumentation cables shall be tested for continuity, polarity, undesirable ground, and origination. Such tests shall be performed after installation and prior to placing all wires and cables in service.

END OF WIRE AND CABLES

SECTION 26 05 26 GROUNDING

PART 1 - GENERAL

1.01 The Requirement

- A. The CONTRACTOR shall provide the electrical grounding system, complete and operable, in accordance with the Contract Documents.
- B. The requirements of Section 26 00 00 – Electrical Work, General apply to this Section.
- C. Single Manufacturer: Like products shall be the end product of one manufacturer in order to achieve standardization of appearance, operation, maintenance, spare parts and manufacturer's services.

1.02 Contractor Submittals

- A. Furnish submittals in accordance with Section 01 33 00 and Section 26 00 00 – Electrical Work, General.
- B. Shop Drawings: Manufacturer's product information for connections, clamps, and grounding system components, showing compliance with the requirements of this Section.

PART 2 - PRODUCTS

2.01 General

- A. Components of the grounding electrode system shall be manufactured in accordance with ANSI/UL 467 - Standard for Safety Grounding and Bonding Equipment, and shall conform to the applicable requirements of National Electrical Code Article 250 and local codes.

2.02 Grounding System

- A. Grounding loop conductors shall be bare annealed copper conductors suitable for direct burial. Conductors shall be No. 2/0 for 100A services, or No. 4/0 for all other service sizes, unless indicated otherwise.
- B. Ground Rods
 - 1. Unless indicated otherwise, ground rods shall be a minimum of 3/4-inch in diameter, 10 feet long, and have a uniform covering of electrolytic copper metallically bonded to a rigid steel core. The copper to steel bond shall be corrosion resistant.
 - 2. Conform to ANSI/UL 467.
 - 3. Sectional type joined by threaded copper alloy couplings.
- C. Buried cable-to-cable and cable-to-ground rod connections shall be made using exothermic welds by Cadweld, Enrico Products, or equal.

- D. Exposed grounding connectors shall be of the compression type (connector to cable), made of high copper alloy, and be manufactured specifically for the particular grounding application. The connectors shall be Burndy, O.Z. Gedney, or equal.
- E. Grounding clamps shall be used to bond each separately derived system to the grounding electrode conductors.
- F. Equipment Grounding Circuit Conductors
 - 1. These conductors shall be the same type and insulation as the load circuit conductors. The minimum size shall be as outlined in Table 250.122 of the National Electrical Code, unless indicated otherwise.
 - 2. Metallic conduit systems shall have equipment grounding wires as well as being equipment grounding conductors themselves.
- G. Ground clamps in concrete shall be rated for use with rebar and embedded in concrete.
- H. Manufacturers of grounding materials shall be Copperweld, Blackburn, Burndy, or equal.

PART 3 - EXECUTION

3.01 Grounding

- A. Provide a separate grounding conductor, securely grounded in each raceway independent of raceway material.
- B. Provide a separate grounding conductor for each motor and connect at motor box. Do not use bolts securing motor box to frame or cover for grounding connectors.
- C. Size in accordance with the NEC-Article 250 and local amendments.
- D. Route conductors inside raceway.
- E. Provide a green insulated wire as grounding jumper from the ground screw to a box grounding screw and, for grounding type devices, to equipment grounding conductor.
- F. Provide a separate grounding conductor in each individual raceway for parallel feeders.
- G. Bond metallic cold water pipe systems and metallic building structure per NEC. Bond ALL metallic water pipe penetrations.
- H. Measure ground impedance in accordance with IEEE STD 81 after installation but before connecting the electrode to the remaining grounding system.
- I. Low Voltage Grounded System (600-volt or less): A low voltage grounded system is a system where the local power supply is a transformer with the transformer secondary grounded.
 - 1. Grounding system connections for a premises wired system supplied by a grounded AC service shall have a grounding electrode connector

connected to the grounded service conductor at each service, in accordance with the NEC.

2. The grounded circuit conductor shall not be used for grounding non-current carrying parts of equipment, raceways, and other enclosures except where specifically listed and permitted by the NEC.

J. Embedded Ground Connections

1. Underground and grounding connections embedded in concrete shall be UL listed compression type ground grid connectors.
2. The connection shall be made in accordance with the manufacturer's instructions.
3. The CONTRACTOR shall not conceal or cover any ground connections until the ENGINEER or authorized representative has established that every grounding connection conforms to the Contract Documents and has given the CONTRACTOR written confirmation.

K. Ground Rods

1. Locations shall be as determined in the field.
2. Rods forming an individual ground array shall be equal in length.
3. Rod spacing shall be a minimum of the rod length.

L. Shield Grounding

1. Shielded instrumentation cable shall have its shield grounded at one end only unless Shop Drawings indicate the shield will be grounded at both ends.
2. The grounding point shall be at the control panel or otherwise at the receiving end of the signal carried by the cable.
3. Termination of shield drain wire shall be on its own terminal screw.
4. Terminal screws shall be jumpered together using manufactured terminal block jumpers.
5. Connection to the ground bus shall be via a minimum green No. 12 conductor to the main ground bus for the panel.

END OF GROUNDING

SECTION 26 05 33 ELECTRICAL RACEWAY SYSTEMS

PART 1 -- GENERAL

1.01 The Requirement

- A. The CONTRACTOR shall provide electrical raceway systems, complete and in place, in accordance with the Contract Documents.
- B. In addition to NEC requirements, provide an equipment grounding conductor run with or enclosing the circuit conductors in all raceways. The equipment grounding conductor shall be one or more or a combination of the following:
 - 1. A copper, or copper-clad aluminum conductor.
 - 2. This conductor shall be solid or stranded; insulated, covered, or bare; and in the form of a wire or a bus bar of any shape.

1.02 DEFINITIONS

- A. Raceway System – raceway system consists of conduits, wireways, fittings, junction and pull boxes, supports and labels complete and ready for conductors.

PART 2 -- PRODUCTS

2.01 General

- A. Conduits, wireways, fittings, supports, labels, junction and pull boxes, and other indicated enclosures which are dedicated to the raceway system, shall comply with the requirements of this Section.

2.02 Conduit

- A. Galvanized Rigid Steel Conduit (GRC)
 - 1. Rigid steel conduit shall be mild steel, hot-dip galvanized inside and out.
 - 2. Rigid steel conduit shall be manufactured in accordance with ANSI C80.1 - Rigid Steel Conduit, Zinc Coated, and UL-6.
 - 3. Manufacturers, or Equal
 - a. LTV Steel;
 - b. Triangle;
 - c. Wheatland Tube.
 - 4. GRC shall be used in damp, wet or exterior exposed locations and in process areas.
- B. Liquidtight Flexible Conduit (LFMC)
 - 1. Liquidtight flexible conduit (LFMC) shall be constructed of a flexible galvanized metal core with a sunlight-resistant thermoplastic outer jacket.

2. LFMC shall be manufactured in accordance with UL-360 - Steel Conduits, Liquid-Tight Flexible.
 3. Manufacturers, or Equal
 4. Anaconda, "Sealtite";
 5. Electriflex, "Liquatite".
- C. Electrical Metallic Tubing (EMT)
1. Electrical metallic tubing shall be mild steel, hot-dip galvanized tubing complying with ANSI C80.3 and Fed.Spec. WWC-563 and shall be UL listed.
 2. Elbows, bends, and fittings shall be made from full weight materials complying with the above and shall be coated the same as electrical metallic tubing.
 3. EMT connectors and couplings shall be compression type with insulated throat. Set screw type not allowed. Fittings shall comply with UL514B.
 4. Electrical metallic tubing shall be 3/4-inch trade size or larger and shall be manufactured by Allied Tube and Conduit Corp., Triangle PWC, Inc., or approved equal.
 5. EMT conduit may be used in dry interior, non-process locations only.
- D. Polyvinyl Chloride Conduit (PVC)
1. Polyvinyl chloride conduit shall be in compliance with UL651.
 2. Elbows, bends, and fittings shall be made from full weight materials complying with the above.
 3. Polyvinyl chloride conduit shall be 3/4-inch trade size or larger and shall be manufactured by Cantex, United Pipe, or approved equal.
 4. PVC conduit shall only be used in the chemical storage area.
- 2.03 Fitting And Boxes
- A. General:
1. Pressed or stamped steel boxes shall be used with EMT.
 2. Cast and malleable iron fittings for use with metallic conduit shall be the threaded type with 5 full threads.
 3. Fittings and boxes shall have neoprene gaskets and non-magnetic stainless steel screws. All covers shall be attached by means of holes tapped into the body of the fitting. Covers for fittings attached by means of clips or clamps will not be acceptable.
 4. In outdoor areas, raceways shall be terminated in raintight hubs as manufactured by Myers, O.Z. Gedney, or equal. In other than outdoor areas, sealed locknuts and bushings shall be used.

5. Fittings and boxes in hazardous locations shall be suitable for the Class and Division indicated or required by code.
- B. Cast Aluminum Fittings and Boxes
 1. Cast aluminum boxes and fittings shall have less than 0.40 percent copper content.
 2. Manufacturers, or Equal
 3. O.Z. Gedney;
 4. Appleton;
 5. Crouse-Hinds.
- C. Malleable Iron Fittings and Boxes
 1. Fittings and boxes for use with galvanized steel conduit shall be of malleable iron or gray-iron alloy with zinc plating with same finish as the conduit.
 2. Manufacturers, or Equal
 - a. O.Z. Gedney;
 - b. Crouse-Hinds;
 - c. Appleton.
- D. Stainless Steel Boxes
 1. Stainless steel boxes shall be NEMA 4X, Type 304.
 2. Stainless steel shall be a minimum 14-gauge thickness, with a brushed finish.
 3. Doors shall have full-length stainless steel piano hinges. Non-hinged boxes are not acceptable.
 4. Manufacturers, or Equal
 - a. Hoffman;
 - b. Rohn;
 - c. Hammond.
- E. PVC Boxes and Conduit Bodies
 1. PVC boxes and conduit bodies shall be NEMA 4X, non-metallic and UL Listed.
 2. Manufacturers, or Equal
 - a. Cantex;
 - b. Carlon;

2.04 Cable Trays

- A. Cable trays are not to be used.

PART 3 -- EXECUTION

3.01 General

- A. All wiring shall be run in raceway unless indicated otherwise.
- B. Raceways shall be installed between equipment as indicated. Raceway systems shall be electrically and mechanically complete before conductors are installed. Bends and offsets shall be smooth and symmetrical, and shall be accomplished with tools designed for this purpose. Field bends are required on conduits up to 2". Factory elbows may be utilized on raceways over 2". All fittings and connections shall be made tight.
- C. Separate raceway systems shall be provided for:
 - 1. Analog signals
 - 2. 24 VDC discrete signals and instrument power supply conductors
 - 3. 120 VAC and higher wiring
 - 4. Intrinsically safe wiring
- D. When non-loop powered instruments have only one raceway port, the CONTRACTOR may run both the analog and 24 VDC wiring in a short length of ½" LFMC to a splitter box where the wiring must then be separated into the required raceway system. The length of LFMC must be kept to the absolute minimum and must not exceed 3 feet unless written approval has been given by the ENGINEER.
- E. Where raceway routings are indicated on plan views, follow those routings to the extent possible.
- F. Routings shall be adjusted to avoid obstructions. Coordinate between trades prior to installation of raceways. Lack of such coordination shall not be justification for extra compensation, and removal and re-installation to resolve conflicts shall be by the CONTRACTOR as part of the WORK.
- G. Support rod attachment for ceiling-hung trapeze installations shall meet the seismic requirements.
- H. Exposed raceways shall be installed parallel or perpendicular to structural beams.
- I. Install expansion fittings with bonding jumpers wherever raceways cross building expansion joints.
- J. Exposed raceways shall be installed at least 1/2-inch from walls or ceilings except that at locations above finished grade where damp conditions do not prevail, exposed raceways shall be installed 1/4-inch minimum from the face of walls or ceilings by the use of clamp backs or struts.
- K. In underground facilities or NEMA 4X areas, all raceway penetrations in panels shall be bottom entry.

- L. Wherever contact with concrete or dissimilar metals can produce galvanic corrosion of equipment, suitable insulating means shall be provided to prevent such corrosion.
- M. To facilitate future expansion, boxes and fittings are to be installed when indicated on the drawings. Unused hubs are to be plugged with proprietary devices. Raceways that include future expansion provision are to be sized to accommodate any such specified wiring without exceeding the requirements of this specification.

3.02 Raceways

- A. Exposed raceway systems shall be of the type specified for the area installed as identified herein.
- B. Raceways concealed, or encased in concrete shall be PVC-Coated GRC. Conduit shall emerge from the concrete perpendicular to the surface whenever possible.
- C. Exposed conduit shall be 3/4-inch minimum trade size. Supports shall be installed at distances required by the NEC.
- D. Conduit shall not be encased in the bottom floor slab below grade.
- E. Concrete cover for conduit and fittings shall not be less than 1-1/2 inches for concrete exposed to earth or weather, or less than 3/4-inch for concrete not exposed to weather or in contact with the ground.
- F. Raceways passing through a slab, wall, or beam shall not impair significantly the strength of the construction.
- G. Raceways embedded within a slab, wall, or beam (other than those merely passing through) shall satisfy the following:
 - 1. Conduits with their fittings embedded within a column shall not displace more than 4 percent of the gross area of cross section.
 - 2. Conduits shall not be larger in outside dimension than one third the overall thickness of slab, wall, or beam in which embedded.
 - 3. Raceways shall not be spaced closer than 3 outside diameters on centers.
- H. Raceways shall be placed so that cutting, bending, or displacing reinforcement from its proper location will not be required.
- I. Threads shall be coated with a conductive lubricant before assembly.
- J. Joints shall be tight, thoroughly grounded, secure, and free of obstructions in the pipe. Conduit shall be adequately reamed to prevent damage to the wires and cables inside. Strap wrenches and vises shall be used to install conduit to prevent wrench marks on conduit. Conduit with wrench marks shall be replaced.
- K. Wherever raceways enter substructures below grade, the raceways shall be sloped to drain water away from the structure. Extreme care shall be taken to avoid pockets or depressions in raceways.

- L. Connections to motors and other equipment subject to vibration shall be made with LFMC not exceeding 36 inches in length. Equipment subject to vibration that is normally provided with wiring leads shall be provided with a cast junction box for the make-up of connections. The junction box is to be independently supported and not left free to hang from the equipment.
- M. Raceways passing through walls or floors shall have plastic sleeves. Core drilling shall be performed in accordance with Section 26 00 00.
- N. Conduit, fittings, and boxes required in hazardous classified areas shall be suitably rated for the area and shall be provided in strict accordance with NEC requirements.
- O. Empty raceways shall be tagged at both ends to indicate the final destination. Where it is not possible to tag the raceway, destination shall be identified by a durable marking on an adjacent surface. A pull-cord shall also be installed in each empty conduit. This shall apply to conduits in floors, panels, manholes, equipment, etc.
- P. Where an underground raceway enters a structure through a concrete roof or a membrane waterproofed wall or floor, core-drill the entrance and provide a Link-Seal, or equal, sealing device. The sealing device shall be utilized with PVC-coated GRC/rigid steel conduit.
- Q. Final connections to heaters, instruments, motors, limit switches, and any equipment subject to vibration shall be made with LFMC and approved fittings. Maximum length of LFMC shall be 36 inches.
- R. Connections to solenoid valves, pilot actuators, etc. shall be made with LFMC and approved fittings to a cast box with screw cover (GUA type), independently and securely supported. In no case is the device to support the cast box.

END OF ELECTRICAL RACEWAY SYSTEMS

SECTION 26 24 16 PANELBOARDS

PART 1 - GENERAL

1.01 The Requirement

- A. The CONTRACTOR shall provide panelboards complete and operable, in accordance with the Contract Documents.
- B. Single Manufacturer: Like products shall be the end product of one manufacturer in order to achieve standardization of appearance, operation, maintenance, spare parts, and manufacturer's services.

1.02 Contractor Submittals

- A. General: Submittals shall be in accordance with Division 01 specification requirements and Section 26 00 00 – Electrical Work, General.
- B. Shop Drawings
 - 1. Breaker layout drawings with dimensions and nameplate designations
 - 2. Component list
 - 3. Drawings of conduit entry/exit locations
 - 4. Assembly ratings including:
 - a. Trip
 - b. Interrupting
 - c. Voltage
 - d. Continuous current
 - 5. Cable terminal sizes
 - 6. Descriptive bulletins
 - 7. Product sheets
 - 8. Installation information
 - 9. Seismic certification and equipment anchorage details

PART 2 - PRODUCTS

2.01 Panelboards

- A. Panelboards shall be dead front factory assembled. Panelboards shall comply with NEMA PB-1-Panelboards, as well as the provisions of UL 50 – Safety Enclosures for Electrical Equipment and UL 67 – Safety Panelboards. Panelboards used for service equipment shall be UL labeled for such use.

Lighting panelboards shall be rated for 120/208-volt, 3-phase operation or 120/240-volt for single phase operation as indicated. Power panelboards shall be rated for 480 volts, 3-phase, 3-wire operation.

- B. The manufacturer of the panelboard shall be the manufacturer of the major components within the assembly, including circuit breakers.
- C. Ratings
 - 1. Panelboards rated 240 VAC or less shall have short circuit ratings not less than 10,000 amps RMS symmetrical or as indicated on the plans.
 - 2. Panelboards shall be labeled with a UL ampere interrupting rating. Series ratings are not acceptable.
- D. Construction
 - 1. All lighting and power distribution panels shall have copper bus bars.
 - 2. Breakers shall be one, two, or three pole as indicated, with ampere trip ratings as required by the equipment. Breakers shall be quick-make and quick-break, inverse time trip characteristics, to trip free on overload or short circuit, and to indicate trip condition by the handle position. Breakers shall be of the bolt-on type.
 - 3. The panels shall have hinged doors with combination catch and latch. The front panels shall be so arranged that when the plates are removed, the gutters, terminals and wiring will be exposed and accessible. The doors shall have inner doors within the plates to have only the breaker operating mechanism exposed when they are opened. Live conductors and terminals shall be concealed behind the plates.
 - 4. All panelboards shall be rated for the intended voltage.
 - 5. All circuit breakers shall be interchangeable and capable of being operated in any position as well as being removable from the front of the panelboard without disturbing adjacent units. No plug-in circuit breakers will be acceptable.
 - 6. Lighting and power distribution panels which are not part of a motor control center shall be constructed in accordance with Section 26 05 00 – Electrical Work, General. Panels shall have the necessary barriers, supports, and liberal wiring gutters. Trim screws shall be stainless steel. All panelboard parts of metal other than copper, aluminum, or stainless steel shall be cadmium plated. Panelboards shall be manufactured by **Square D / Schneider Electric**.
 - 7. Panelboards shall be UL listed except for special enclosures which are not available with UL listing.
 - 8. Panelboards shall be suitable for use as service entrance as indicated or as otherwise required by the NEC.

PART 3 - EXECUTION

3.01 General

- A. All WORK of this Section shall be installed as indicated in Section 26 00 00 – Electrical Work, General.

END OF PANELBOARDS

SECTION 26 27 26 WIRING DEVICES

PART 1 - GENERAL

1.01 The requirement

- A. The CONTRACTOR shall provide all wiring devices, plates, and nameplates in accordance with the Contract Documents.
- B. The requirements of Section 26 00 00 – Electrical General Requirements apply to this Section.
- C. Single Manufacturer: Like products shall be the end product of one manufacturer in order to achieve standardization of appearance, operation, maintenance, spare parts, and manufacturer's services.

1.02 Contractor Submittals

- A. Furnish submittals in accordance with Section 01 33 00.
- B. Shop Drawings
 - 1. Complete catalog cuts of switches, receptacles, enclosures, covers, and appurtenances, marked to clearly identify proposed materials.
 - 2. Documentation showing that proposed materials comply with the requirements of NEC and UL.
 - 3. Documentation of the manufacturer's qualifications.

PART 2 - PRODUCTS

2.01 General

- A. All devices shall carry the UL label.
- B. General purpose duplex receptacles and toggle switch handles shall be brown everywhere except in finished rooms where they shall be ivory. Special purpose receptacles shall have a body color as indicated. Receptacles and switches shall conform to Federal Specifications W-C-596E and W-S-896E, respectively.

2.02 Lighting Switches

- A. Local branch switches shall be toggle type, rated at 20 amps, 120-277 VAC, and shall be General Electric Cat. No. GE-5951-1 for single pole, GE-5953-1 for 3-way and GE-5954-1 for 4-way, or similar types as manufactured by Hubbell, or equal.

2.03 General Purpose Receptacles

- A. Duplex receptacles rated 120-volt, 20 amps shall be polarized 3-wire type for use with 3-wire cord with grounded lead and 1 designated stud shall be permanently grounded to the conduit system (NEMA 5-20R). Duplex 120-volt receptacles

shall be G.E. 5362, Hubbell 5362, or equal. Simplex receptacles shall be G.E. 4102, Hubbell 4102, or equal.

- B. Ground-fault circuit interrupting receptacles (GFCI's) shall be installed at the locations indicated. GFCI's shall be rated 125-volt, 20 amps and shall be Hubbell GFTR20, or equal. Downstream GFCI protection through the use of feed-thru receptacles is not acceptable.

2.04 Special Receptacles

- A. Dryer receptacle (NEMA 14-30R), 30 amp. 250VAC, 3-pole, 4-wire. Verify requirements with installed equipment.

2.04 Enclosures And Covers

- A. Interior mounted switches and receptacles shall have steel device covers of the size required.
- B. In exterior or wet location areas, FS or FD type cast boxes shall be used, switch and receptacle covers shall be Crouse-Hinds, Hubbel or equal.
- C. Receptacles in exterior locations shall be provided with cover/enclosure marked "Suitable for Wet Locations when in use" and "UL Listed." There shall be a gasket between the enclosure and the mounting surface and between the hinged cover and mounting plate/base. The cover shall be weatherproof and of 'While-In-Use' type, specification grade, of metallic construction. TayMac or equal.

2.05 Nameplates

- A. Provide nameplates or equivalent markings on switch enclosures to indicate ON and OFF positions of each switch. ON and OFF for 3-way or 4-way switches is not acceptable. Provide receptacles for special purposes with nameplates indicating their use. Conform to requirements of Section 26 00 00 – Electrical Work, General.

PART 3 - EXECUTION

3.01 Connection

- A. Securely fasten nameplates using stainless steel screws, bolts, or rivets centered under or on the device, unless otherwise indicated.

3.02 Grounding

- A. Ground all devices, including switches and receptacles, in accordance with NEC Article 250 and Section 26 05 26 – Grounding.
- B. Ground switches and associated metal plates through switch mounting yoke, outlet box, and raceway system.

- C. Ground flush receptacles and their metal plates through positive ground connections to outlet box and grounding system. Maintain ground to each receptacle by spring-loaded grounding contact to mounting screw or by grounding jumper, each making positive connection to outlet box and grounding system at all times.

3.03 Field Testing

- A. Provide checkout, field, and functional testing of wiring devices in accordance with Section 26 00 00 – Electrical Work General Requirements.
- B. Test each receptacle for polarity and ground integrity with a standard receptacle tester.

END OF WIRING DEVICES

SECTION 26 28 16

SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.01 Summary

- A. This Section describes general requirements, products, and methods of execution relating to overcurrent protective devices approved for use on this project. Type, duty rating and characteristics, fault interrupting capability and coordination requirements shall be determined from the plans.

1.02 Related Work

- A. The work of the following Sections is related to the work of this Section. Other Sections, not referenced below, may also be related to this work. It is the Contractor's responsibility to perform all the work required by the Contract Documents.

- 1. Division 26 00 00 – Electrical General Requirements

1.03 Submittals

- A. In accordance with the requirements of Section 01 33 00, submit the following Project Data:

- 1. Descriptive literature bulletins, and catalog cuts of the equipment.
 - 2. Materials of construction.
 - 3. Complete wiring diagrams.
 - 4. Complete installation instructions, with points of electrical connection requirements clearly shown.
 - 5. Performance curves.

1.04 Quality Assurance

- A. Devices shall be the latest approved design as manufactured by a nationally recognized manufacturer and in conformity with applicable standards and UL listed.

PART 2 - PRODUCTS

2.01 Molded Case Circuit Breakers

- A. Molded case circuit breakers shall be suitable for individual as well as panelboard mounting. They shall be bolt-on type, unless "plug-on" type specifically allowed.
- B. The breakers shall meet NEMA and/or UL specifications as applicable to frame and size, standard rating and interrupting capability. Breakers installed in panelboards shall have short circuit interrupt ratings that match those of the panelboard.
- C. The breakers shall be one-, two-, or three-pole as scheduled, operate manually for normal ON-OFF switching and automatically under overload and short circuit conditions.

- D. Operating handle shall open and close all poles simultaneously on a multi-pole breaker. Operating mechanism shall be trip-free so that contacts cannot be held closed against abnormal overcurrent or short circuit condition.

2.02 Acceptable Manufacturer's

- A. Square D / Schneider Electric
- B. Or approved equal

PART 3 - EXECUTION

3.01 Installation

- A. Size devices as required by the load being served or as shown on the drawings.

END OF SWITCHES AND CIRCUIT BREAKERS

SECTION 26 29 13 MOTOR CONTROLLERS

PART 1 - GENERAL

1.01 The Requirement

- A. Furnish and install manual motor starters for manual starting and for motor disconnect.

1.02 Codes And Standards

- A. All electrical equipment and materials specified herein shall be listed by and shall bear the label of Underwriters Laboratories (UL), Factory Mutual (FM) or other nationally recognized testing laboratory acceptable to the State of Alaska Mechanical Inspections Division.

1.03 Submittals

- A. Provide outline drawings with dimensions, and equipment ratings for voltage, amperage, and short circuit in accordance with Section 01 33 00 and Section 26 00 00 – Electrical Work, General.

PART 2 - PRODUCTS

2.01 AC Fractional Horsepower Manual Starters

- A. The manual starter shall consist of a manually operated toggle switch equipped with melting alloy-type thermal overload relay.
- B. Thermal unit shall be one-piece construction and interchangeable. Starters shall be inoperative if thermal unit is removed. Spare thermal elements shall be provided for all sizes used.

2.02 Enclosure

- A. Mechanical room: NEMA Type 1 enclosure with gray baked enamel paint which is electrodeposited on cleaned, phosphate pre-treated galvanized steel.
- B. Storage room: NEMA Type 4X non-metallic enclosure.

2.03 Manufacturers

- A. Motor starters shall be manufactured by Square D, Allen-Bradley, or equal.

PART 3 - EXECUTION**3.01 Installation**

- A. The manual starter shall be installed in accordance with the Manufacturer's requirements and recommendations.

3.02 Nameplates

- A. Provide nameplates for all starters. Coordinate names with mechanical equipment lists.

3.03 Overload Protection

- A. Install overload protection. Verify that protection corresponds to motor full load current and that motors starts and operates properly.

END OF MOTOR CONTROLLERS

SECTION 26 50 00 LIGHTING

PART 1 - GENERAL

1.01 The Requirement

- A. The CONTRACTOR shall provide lighting fixtures, supports, lamps, and accessories, complete and operable, in accordance with the Contract Documents.

1.02 Contractor Submittals

- A. If the CONTRACTOR proposes to install equivalent equipment to that suggested, then he shall furnish the following product information in accordance with Division 01.

1. Interior luminaires

- a. Catalog data sheets and pictures.
- b. Luminaire finish and metal gauge.
- c. Lens material, pattern, and thickness.
- d. Candle power distribution curves in two or more planes.
- e. Candle power chart 0 to 90 degrees.
- f. Lumen output chart.
- g. Average maximum brightness data in foot lamberts.
- h. Coefficients of utilization for zonal cavity calculations.
- i. Mounting or suspension details.
- j. Heat exchange and air handling data.

2. Exterior luminaires

- a. Catalog data sheets and pictures.
- b. Luminaire finish and metal gauge.
- c. Lens material, pattern, and thickness.
- d. IES lighting classification and isolux diagram.
- e. Fastening details to wall or pole.
- f. Ballast type, location, and method of fastening.
- g. For light poles, submit wind loading, complete dimensions, and finish.

3. Lamps

- a. Voltages.
- b. Colors.

- c. Approximate life (in hours).
 - d. Approximate initial lumens.
 - e. Lumen maintenance curve.
 - f. Lamp type and base.
- 4. Ballasts/Drivers
 - a. Type.
 - b. Wiring diagram
 - c. Nominal watts and input watts.
 - d. Input voltage and power factor.
 - e. Starting current, line current, and restrike current values.
 - f. Sound rating.
 - g. Temperature rating.
 - h. Efficiency ratings.
 - i. Low temperature characteristics.
 - j. Emergency ballasts/drivers rating and capacity data.

PART 2 - PRODUCTS

2.01 Fixtures - General

- A. Luminaires: Specific requirements relative to execution of WORK of this Section are located in the Luminaire Schedule on Contract Drawings.
- B. All fixtures shall be pre-wired with leads of 18-AWG, minimum, for connection to building circuits.

2.02 Exterior Fixtures

- A. Exterior fixtures in combination with their mounting pole and bracket shall be capable of withstanding 100 MPH winds without damage. Exterior fixtures shall have corrosion-resistant hardware and hinged doors or lens retainer. Fixtures specified to be furnished with integral photo-electrical control shall be of the fixture manufacturer's standard design.

2.03 Interior Fixtures

- A. Interior fixtures without diffusers shall be furnished with end plates. Where diffusers are required, they shall be of high molecular strength acrylic. Minimum thickness of the acrylic shall be 0.125 inches for all diffusers, except that those on 4-foot square fixtures shall be 0.187 inches thick.
- B. Interior fixtures within the chemical room shall be suitable for installation in this area.

C. Emergency Exit Signs

1. Internally illuminated.
2. Universal mounting type.
3. Internal 6-volt nickel cadmium battery, 90 minutes capacity to emergency lamps.
4. Two-rate regulated battery charger to minimize energy consumption. Filtered charger output to minimize voltage ripple and extend battery life. Thermal protection and current-limiting charger circuitry to prevent overheating and charger failure.
5. 19,000 hours expected lamp life.
6. Press to test button.
7. Directional arrows.
8. Red letters on a white panel, 6 inches high.

2.04 Photo-Electric Cells

- A. Photoelectric cells for control of multiple fixtures shall be self-contained, weatherproof type, rated for 1800 va 120-volt, single pole, single throw, and shall be provided with time-delay features. Photoelectric cell shall be **Tork Model 2101**, or equal.

2.05 Light Fixture Control Relays

- A. Relays for light fixtures control shall be mechanically held. Such relays shall be based-mounted, single-purpose units, i.e., not attachments to a multi-purpose solenoid operator.
- B. If not indicated otherwise, coil voltage shall be 115 VAC with contacts rated at 20 amps. Relays shall be **ASCO Series 166, Zenith Series MSC**, or equal.

2.06 Fixture Types

- A. Specific requirements are located in the Lighting Fixture Schedule on the Contract Drawings.

PART 3 - EXECUTION

3.01 Luminaires

- A. Install in accordance with manufacturer's recommendations.
- B. Provide necessary hangers, pendants, and canopies.
- C. Provide additional ceiling bracing, hanger supports, and other structural reinforcements to building required to safely mount.
- D. Install plumb and level.

- E. Locate luminaires to avoid both conflict with other building systems and blockage of luminaire light output.

3.02 Cleaning Following Installation

- A. Remove all labels and other markings, except UL listing mark.
- B. Wipe luminaires inside and out to remove construction dust.
- C. Clean luminaire plastic lenses with antistatic cleaners only.
- D. Touch up all painted surfaces of luminaires and poles with matching paint ordered from manufacturer.
- E. Replace all defective light sources at time of Substantial Completion.

END OF LIGHTING

SECTION 28 31 76**CONVENTIONAL FIRE ALARM SYSTEM****PART 1 - GENERAL****1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract.

1.02 DESCRIPTION

- A. This section of the specification includes the design, furnishing, installation, connection and testing of the new fire alarm system. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, Fire Alarm Control Panel (FACP), auxiliary control devices, annunciators, digital alarm communications to central stations, conduit, device boxes, and wiring as shown on the drawings and specified herein. Contractor shall be responsible for the final design and all materials and labor to provide a complete system.
- B. The fire alarm system shall comply with requirements of the 2019 edition of NFPA 72 for Local Protected Premises Signaling Systems. The system field wiring shall be supervised either electrically or by software-directed polling of field devices.
- C. The Secondary Power Source of the fire alarm control panel will be capable of providing at least 24 hours of backup power with the ability to sustain 5 minutes in alarm at the end of the backup period.
- D. The fire alarm system shall be manufactured by an ISO 9001 certified company and meet the requirements of BS EN9001: ANSI/ASQC Q9001-1994.
- E. The FACP and peripheral devices shall be manufactured or supplied 100% by a single U.S. manufacturer (or division thereof).
- F. The installing company shall employ NICET (minimum Level II Fire Alarm) technicians on site to guide the final check-out and to ensure the systems integrity.
- G. The FACP shall meet requirements of UL ANSI 864 Ninth Edition.

1.03 SCOPE

- A. A microprocessor-controlled, fire alarm system shall be installed in accordance with the project specifications, the project drawings, and applicable codes and standards.

B. Add new devices to the system as necessary to comply with applicable Codes and standards.

C. Provide supervision of new fire sprinkler system alarm and tamper switches as necessary.

D. Basic Performance:

1. Initiation Device Circuits (IDC) shall be wired Class B.
2. Notification Appliance Circuits (NAC) shall be wired Class B.
3. All circuits shall be power-limited, per UL864 requirements.
4. A single ground fault or open circuit on the system Signaling Line Circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.
5. Alarm signals arriving at the main FACP shall not be lost following a primary power failure or outage of any kind until the alarm signal is processed and recorded.

E. Basic System Operation

1. When a fire alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur:
 - a. The system Alarm LED on the FACP shall flash.
 - b. A local sounder with the control panel shall sound.
 - c. A backlit 80-character LCD display on the FACP shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises.
 - d. In response to a fire alarm condition, the system will process all control programming and activate all system outputs (alarm notification appliances and/or relays) associated with the point(s) in alarm as defined by the operational matrix provided on the drawings. Additionally, the system shall send events to a central alarm supervising station via the internal DACT interfaced with an IPGSM communicator.

1.04 SUBMITTALS

A. Shop Drawings, Product Data, and Calculations:

1. The contractor shall prepare shop drawings in accordance with NFPA 72 requirements. Drawings, product data, and calculations shall be submitted to the AHJ by the contractor. The contractor shall also submit drawings, product data and calculations to the Engineer for review and approval. Final approved drawings by the AHJ and the Engineer shall be used for installation.
2. The contractor shall maintain up-to-date red-line as-built drawings on site during the course of the installation. The Contractor shall include final as-built drawings in the Operation and Maintenance Manuals.

B. Qualifications:

1. Prior to construction, Submit the following items to the Engineer for approval:
 - a. Fire Alarm Vendor State License.
 - b. Fire Alarm Installing Technicians State Licenses.
 - c. Fire Alarm Installing Technicians NICET II Certifications.
 - d. Fire Alarm Designer Technicians NICET IV Certifications.
 - e. Fire Alarm Designer Technicians State Licenses.

C. Manuals:

1. Operation & Maintenance manuals shall be prepared by the Contractor and submitted to the Owner. The manuals shall include the following information to be provided by the contractor.
 - a. Following successful final acceptance testing of the system, the fire alarm contractor shall provide a letter of warranty for the system in electronic format for inclusion in O&M manuals.
 - b. Following successful final acceptance testing of the system, the fire alarm contractor shall provide completed NFPA 72 Inspection & Testing and Record of Completion forms. The Record of Completion shall be signed by the contractor and the AHJ. Final testing documentation will be included in O&M manuals.
 - c. Following successful final acceptance testing of the system, provide an electronic copy of the panel programming software including any necessary cables, keys, codes, and licenses along with the site-specific program database in electronic format for inclusion in O&M manuals.

- d. Provide hard copy and electronic copy (PDF and .DWG) of the as-built drawings.
- e. Provide a copy of the final panel software configuration and programming.

D. Software Modifications

1. Provide the services of a qualified technician to perform all system software modifications, upgrades, or changes. Response time of the technician to the site shall not exceed 4 hours.
2. Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site. Modification of software shall not require power-down of the system or loss of system fire protection while modifications are being made.

1.05 GUARANTY

- A. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance. The full cost of maintenance, labor and materials required to correct any defect during this one year period shall be included in the submittal bid.

1.06 QUALIFICATIONS

- A. The contractor shall be licensed by the State of Alaska to sell, service, and install fire alarm systems. Minimum NICET Level II fire alarm technicians shall install and terminate all fire alarm devices and control equipment. Submit proof of State licensing of company and technicians.

1.07 APPLICABLE STANDARDS AND SPECIFICATIONS

- A. The specifications and standards listed below form a part of this specification. The system shall fully comply with these standards.
 1. National Fire Protection Association (NFPA):
 2. 2019 Edition, NFPA 13
 3. 2020 Edition, NFPA 70

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4. 2019 Edition, NFPA 72
 5. 2021 Edition, International Building Code
 6. 2021 Edition, International Fire Code
 7. The system and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and the installation shall be in compliance with the UL listing:

No. 38 Manually Actuated Signaling Boxes

No. 50 Cabinets and Boxes

No. 864 Control Units for Fire Protective Signaling Systems

No. 268 Smoke Detectors for Fire Protective Signaling Systems

No. 268A Smoke Detectors for Duct Applications

No. 464 Audible Signaling Appliances

No. 521 Heat Detectors for Fire Protective Signaling Systems

No. 1971 Visual Notification Appliances

8. All Local and State Building Codes.
9. All requirements of the Authority Having Jurisdiction (AHJ).
10. The project specifications.

1.08 APPROVALS

- A. The system shall have proper listing and/or approval from one of the following nationally recognized agencies:

UL Underwriters Laboratories Inc.

FM Factory Mutual

PART 2 - PRODUCTS

2.01 EQUIPMENT AND MATERIAL, GENERAL

- A. All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a fire protective signaling system, meeting the National Fire Alarm Code.
- B. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.
- C. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

2.02 CONDUIT AND WIRE

A. Conduit:

- 1. Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements.
- 2. All fire alarm system wiring shall be installed in conduit. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.
- 3. Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, per NEC Article 760-29.
- 4. Wiring for 24 volt DC control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.
- 5. Conduit shall not enter the fire alarm control panel, or any other remotely mounted control panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer.
- 6. Conduit shall be 3/4 inch minimum.

7. All conduits shall be concealed in walls and ceilings. Surface conduit in finished areas is not acceptable.

B. Wire:

1. All fire alarm system wiring shall be new.
2. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm system. Minimum #16 AWG cable shall be utilized for all Signaling Line Circuits. Minimum #14 AWG cable shall be utilized for all Initiating Device Circuits and Notification Appliance Circuits. All 120VAC wiring shall be #12 AWG minimum.
3. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.
4. All low voltage fire alarm system cable shall be jacketed twisted pair FPL rated.
5. The system shall permit the use of IDC and NAC wiring in the same conduit.
6. All field wiring shall be electrically supervised for open circuit and ground fault.

C. Terminal Boxes, Junction Boxes and Cabinets:

1. All boxes and cabinets shall be UL listed for their use and purpose.
- D. The fire alarm control equipment shall be connected to separate dedicated branch circuits, maximum 20 amperes. Circuits shall be labeled at the main power distribution panel in RED as FIRE ALARM. Provide a label on the outside of each fire alarm control equipment cabinet indicating the electrical panel and branch circuit designations serving that cabinet. Fire alarm breakers shall be provided with lock-out devices to prevent tampering by unauthorized personnel. The control panel cabinet shall be grounded securely.

2.03 MAIN FIRE ALARM CONTROL PANEL

- A. Contractor shall install a new FACP.

2.04 SYSTEM COMPONENTS

- A. Notification Appliances

1. Due to corrosive environment in storage area notification appliances to be sealed type to prevent corrosion.
2. Interior notification appliances shall be mounted up 80" a.f.f. to bottom of box, or down 6" from ceiling to top of box, whichever is lower.
3. The visual and audio/visual signaling devices shall be compatible with the 5208, 5495, 5496, 5499, or 5895XL as stated in the installation manuals and be listed with Underwriters Laboratories Inc. per UL 1971 and/or 1638.
4. Visual appliances shall be configured for the candela requirements indicated on the Fire Protection Engineer shop drawings. Visual notification appliances shall be synchronized and conform to the applicable requirements of UL 1971 and conform to the Americans with Disabilities Act (ADA). Fire Alarm Notification Appliances shall have clear high intensity optic lens, xenon flash tubes, and output white light and be marked "Fire". The light pattern shall be disbursed so that it is visible above and below the strobe and from a 90 degree angle on both sides of the strobe. Strobe flash rate shall be 1 flash per second and a minimum of 15 candelas based on the UL 1971 test. Strobe shall be surface or semi-flush mounted.
5. Audible appliance output levels shall be set to "medium" unless otherwise noted. Provide surface or semi-flush mounted electronic horns suitable for use in an electrically supervised circuit. Horns shall have a rating of 90 dBA at 10 feet when tested in accordance with UL 464. Output from the horn shall be three-pulse temporal pattern. Where horns and strobes are provided in the same location, they may be combined into a single unit. Horns used in exterior or cooler/freezer locations shall be specifically listed or approved for outdoor use.

2.05 BATTERIES

- A. Upon loss of Primary (AC) power to the control panel, the batteries shall have sufficient capacity to power the fire alarm system for 24 hours followed by 5 minutes of alarm.
- B. The batteries are to be sealed and completely maintenance free. No liquids shall be required. Fluid level checks for refilling, spills, and leakage shall not be required.
- C. Batteries shall be housed within the associated control equipment's cabinet.
- D. Batteries shall be sized to 120% of the calculated load.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as required by the major equipment manufacturer.
- B. All raceway, junction boxes, supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas as described in the fire alarm general notes on the drawings. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.
- C. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted wherever feasible when located in finished areas and may be surface mounted when located in unfinished areas.

3.02 TEST

- A. NICET level II technicians shall be provided to perform, technically supervise, troubleshoot, and otherwise participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72.
- B. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
- C. The following tests shall be performed at the preliminary and final test stages:
 - 1. Ensure the off-site monitoring account is active and has been placed in TEST mode. Verify the fire alarm system is communicating with the central station.
 - 2. Verify activation/receipt of all manual pull stations.
 - 3. Verify activation/receipt of all smoke detectors.
 - 4. Verify activation/receipt of all sprinkler valve tamper switches.
 - 5. Verify activation/receipt of all sprinkler water flow switches.
 - 6. Verify proper operation of all notification appliances.
 - 7. Open initiating device circuits and verify that the trouble signal actuates.

8. Open and short signaling line circuits and verify that the trouble signal actuates.
9. Open and short notification appliance circuits and verify that trouble signal actuates.
10. Ground all circuits and verify response of trouble signals.
11. Verify all signals were properly received off-site by the central station.
12. All functions included on the operational matrix and devices installed shall be tested and verified.

3.03 FINAL INSPECTION

- A. Request for final acceptance testing shall be accompanied by a signed letter from the contractor indicating the system has been 100% pretested and is ready for final inspection. Provide preliminary completed copies of the NFPA 72 Inspection & Testing form, the NFPA 72 Record of Completion, a device checklist including device address/appliance designators and technician initials next to each device indicating it was successfully pretested, and a hard copy printout of the system programming including device descriptors. At the final inspection, a minimum NICET Level II technician shall demonstrate that the system functions properly in every respect.
- B. Upon completion of all other final acceptance testing activities, the contractor shall perform a complete 24-hour discharge of the system batteries followed by a 5 minute alarm period with AC power off. The disconnection/lock-out of AC power and alarm test shall be witnessed by the owner's representative.
- C. Following successful final acceptance testing, the contractor shall provide final copies of the NFPA 72 Inspection & Testing form, the NFPA 72 Record of Completion, a device checklist including device address/appliance designators and technician initials next to each device indicating it was successfully tested, and a hard copy printout of the system programming including device descriptors for inclusion in final operation and maintenance manuals.

3.04 INSTRUCTION

- A. Instruction shall be provided as required for operating the system. Hands-on on-site demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided to the owner.

3.05 CLOSE-OUT DOCUMENTATION

- A. The contractor shall provide a letter of warranty for the period of one year from the date of final acceptance, red-line as-built drawings, completed final testing documentation (NFPA 72 Inspection & Testing form, NFPA 72 Record of completion, and initialed device list), and

programming software and final site-specific database in electronic format for inclusion in the final operation and maintenance manual close-out package.

- B. The contractor shall provide the final as-built drawings and operation and maintenance manual close-out documentation as noted in these specifications.

END OF SECTION 28 31 76

SECTION 31 20 00 EARTH MOVING

PART 1 - GENERAL

1.01 Summary

- A. This section covers the furnishing of materials, labor, equipment, and supervision required to complete the site earthwork construction including roadway, walkway, parking lot, and building excavation, fill, backfill, site grading, and drainage as shown on the contract Drawings.

1.02 Testing

- A. Where compaction requirements are specified, the maximum soil density shall be determined by one of the laboratory procedures listed below. The particle size distribution of the soil dictates which laboratory procedure should be used.

1. Soils meeting the following gradation requirement and having cohesionless, free-draining characteristics should be tested in accordance with ASTM D 4253 "Maximum Index Density and Unit Weight of Soils Using a Vibratory Table."

<u>U.S. Std. Sieve Size</u>	<u>Percent Passing by Weight</u>
3"	100*
1-1/2"	70-100
No. 200	0-15

2. Soils which do not meet the gradation requirement presented in Item 1 above and which do meet the following gradation requirement should be tested in accordance with ASTM D 1557 "Laboratory Compaction Characteristics of Soil Using Modified Effort [56,000 ft-lb/ft³ (2,700 kN-m/m³)."

The oversize fraction (retained on the No. 4, three-eighth inch, or three-fourth inch sieve, as appropriate) should not be used in performing the D 1557 compaction test. The modified maximum dry unit weight of soils that contain more than five percent oversize should be corrected in accordance with ASTM D 4718, "Correction of Unit Weight and Water Content for Soils Containing Oversize Particles."

<u>U.S. Std. Sieve Size</u>	<u>Cumulative Percent Passing by Weight</u>
3"	100*
3/4"	70-100

3. Soils that do not meet the gradation requirements presented in Items 1 and 2 above should be tested in accordance with one of the methods listed above that have been modified with the concurrence of the project geotechnical engineer.

* The field sample may contain up to 10% cobbles, which should be discarded prior to testing.

- B. The in-place soil density shall be determined in accordance with:

ASTM D 6938 In-place Density and Water Content of Soil and Soil Aggregate by Nuclear Methods (Shallow Depth).

- C. In-place density tests shall be taken on each lift of fill or backfill at the rate of one test per 5,000 square feet of compacted work area. Failing test areas shall be recompact and retested until the compaction requirements are met. The Contractor shall perform a new gradation and hydrometer test for each 2,000 cubic yards of furnished material and each time the furnished material changes from that which was previously approved.

1.03 Submittals

- A. Contractor shall submit a gradation test in accordance with ASTM D 422 on each type and source of material used in fills and backfills. If material is to be non-frost susceptible (NFS), hydrometer tests shall be performed in accordance with ASTM D 422.

- B. Contractor shall submit a circuit and wiring diagram for each thaw wire installation.

1.04 Definitions

- A. NFS Material: NFS material is sand, gravel, crushed stone, or mixtures thereof, which contains no more than three percent particles finer than 0.02 mm by weight.
- B. Structural Fill: Structural fill is defined as load-bearing fill placed under footings, building foundations, structural slabs, roads, and parking areas. All structural fill should consist of NFS material and contain no lumps, frozen material, organic matter, or other deleterious matter. Structural fill shall meet the following gradation requirements. Other fill material, which does not meet this gradation requirement, may be acceptable for use. However, the gradation of such material should be evaluated by the project geotechnical engineer prior to its use.

<u>U.S. Std. Sieve Size</u>	<u>Cumulative Percent Passing by Weight</u>
3"	100*
1-1/2"	70-100
3/4"	30-100
1/2"	25-100
#4	20-49
#40	0-25
#200	0-6
0.02mm	0-3

* The field sample may contain up to 10% cobbles, which should be discarded prior to testing.

- C. D-1 Base Course: NFS, unfrozen, inorganic soils meeting the following gradation requirements for the minus three-inch fraction.

<u>U.S. Std. Sieve Size</u>	<u>Cumulative Percent Passing by Weight</u>
1"	100
3/4"	70-100
3/8"	50-80
No. 4	35-65
No. 8	20-50
No. 50	6-30
No. 200	0-6

- D. Classified Material: NFS, unfrozen, inorganic soils meeting the following gradation requirements for the minus three-inch fraction.

<u>Sieve Size</u>	<u>Cumulative Percent Passing by Weight</u>
3"	100*
1-1/2"	70-100
3/4"	30-100
1/2"	25-100
No. 4	20-49
No. 40	0-25
No. 200	0-6
0.02 mm	0-3

- E. Pipe Bedding Material: The coarse aggregate material conforming to the requirements specified below shall have a percentage of wear not to exceed thirty (30) after five hundred (500) revolutions, as determined by the current requirements of ASTM C-131.

<u>U.S. Std. Sieve Size</u>	<u>Cumulative Percent Passing by Weight</u>
2"	100
1/2"	40-100
#4	20-75
#10	12-60
#40	2-30
#200	0-6

In addition to the grading limits listed above, the fraction of material passing the #200 sieve shall not be greater than twenty (20%) percent of that fraction passing the #4 sieve. The bedding material shall not include mechanically fractured materials.

* The field sample may contain up to 10% cobbles, which should be discarded prior to testing.

- F. Unclassified Material: Inorganic soils free of trash, peat, volcanic ash, debris, or frozen clods, which are capable of being satisfactorily compacted as required by the plans and these specifications.
- G. Unsuitable Material: Soil materials that do not qualify as “classified” or “unclassified” materials.
- H. General Excavation: Any excavation of any type of material, including rock and frozen material, within the limits of excavation as shown on the Drawings or called for in the specifications.
- I. Over-Excavation: Any excavation beyond limits of the contract that has been done without the written authorization of the Owner’s Representative.
- J. Subgrade: The surface upon which classified or unclassified material is placed.
- K. Area Grading: Area grading consists of the excavation and fill work along the perimeter of the site necessary for a smooth transition from the design site grades to the grade(s) of the adjacent properties. This work is also commonly called “site grading” or “overlot grading.”
- L. Work Area: For purposes of determining the number of required in-place density tests, work area is defined as the location where fill is being actively placed at any one time. The work area could be the entire site or a small fraction of the site depending on how the earthwork is performed.

PART 2 - PRODUCTS

2.01 Material Source and Handling

- A. When the quantity of classified and unclassified soils required for the work exceeds that available from excavated materials, the additional material shall be from Contractor-furnished borrow areas. The Contractor shall locate, obtain, develop, and process classified and unclassified materials to complete the requirements of work.
 - 1. No soils materials that have ever been contaminated with petroleum or hazardous substances shall be *incorporated* into the work without prior written approval of the Owner. The Contractor shall furnish evidence that the borrow source(s) has been evaluated for the presence of petroleum or hazardous substances as defined in EPA Publication 9345.00-01A, *Guidance for Performing Preliminary Assessments Under CERCLA*, dated September 1991. An Abbreviated Report of Preliminary Assessment, as defined in EPA Publication 9345.0-01A, shall be submitted to the Owner for each proposed borrow site. The report shall identify any petroleum or hazardous substance, currently or previously at the site, that presents a potential threat to the environment whether or not a release has occurred. Where a release of hazardous substances has occurred, the use of the borrow source will not be allowed. The Preliminary Assessment shall be performed independent of the Contractor, under the direct supervision of a person actively practicing environmental science or engineering, geology, hydrology or a related environmental field and having a minimum of three years experience in

performing Preliminary Assessments. The qualifications of the independent person performing the Preliminary Assessment shall be included with the report. The Preliminary Assessment Report shall be submitted a minimum 30 days prior to use of the borrow material in the work. The Owner reserves the right to independently sample and test the borrow material for conformance with this specification prior to delivery to the site and during placement of the borrow material at the site.

2. Borrow material previously contaminated with a petroleum substance that has been processed or recycled to remove the petroleum contamination may be used only with written approval of the Owner. A request for approval to use processed or recycled material shall be submitted a minimum 30 days prior to use of the material in the work and shall include a detailed description of the history of the material, analytical results of sampling of the material conducted before and after processing or recycling, and a Quality Control Plan describing a program to ensure that the material is transported and placed on the site in an environmentally safe manner. The Quality Control Plan shall include the location(s) on the site the material will be used, the quantity of material proposed to be used at each location, any mixing of the processed or recycled material that may occur, and any safeguard used to protect the environment from being impacted by the material. The request to use processed or recycled material must also show the economic benefit to the Owner for allowing the use of the processed or recycled material.
- B. When the soils into which the excavation will penetrate and/or when the backfill soils are sensitive to erosion, sloughing under seepage forces, softening during soaking, and/or repeated loading of heavy equipment, the Contractor shall take all necessary steps to protect the work at no expense to the Owner. This may include, but is not limited to:
1. Sloping the excavation to drain and/or dewatering from inside the excavation with sumps and/or pumps or from outside the excavation with well-points or other means;
 2. Limiting construction traffic to designated and maintained construction roads and placing additional temporary fill as necessary to support the traffic loads;
 3. Developing alternate access routes; and,
 4. Excavating with a backhoe with a smooth blade from outside the excavation.
- C. If the subgrade or backfill soils are disturbed by surface runoff, ponding, seepage, and/or construction traffic, the disturbed soils shall be regraded and densified to the density requirements specified herein or completely removed and replaced with classified materials compacted to the density requirements specified herein. The Contractor shall perform corrective work at no expense to the Owner.

PART 3 - EXECUTION

3.01 Construction Staking

A. The Contractor shall furnish the following surveys for construction staking:

1. Grade stakes shall be placed to show cuts or fills to finish grade. These may be preserved or referenced by the Contractor to serve for both excavation and subsequent backfill operations.
2. Areas to be excavated under a cubic yard pay unit shall be cross-sectioned after clearing and before any earthwork has commenced. Large areas shall be sectioned on a 50-foot or closer grid and streets and parking lots shall be sectioned at 50-foot stations or closer. After each predetermined area of earthwork is excavated to subgrade or to bottom of organics, the area shall be cross-sectioned again to determine excavation quantities. When possible, measurements shall be made on the same lines or grids used in the previous cross-section. The work shall be scheduled to allow sufficient time for the survey crew to take measurements before additional earthwork takes place.
3. If utilities such as storm drains, sanitary sewers, and water systems are to be constructed as part of the project, areas to be excavated shall be cross-sectioned after utilities are installed and trenches backfilled and compacted to subgrade elevation. After each predetermined area of earthwork is excavated to subgrade or bottom of organics, the area shall be cross-sectioned again to determine excavation quantities.

3.02 Excavation

A. General

1. Excavation consists of the removal and reuse or disposal of all materials encountered to obtain the required subgrade elevations and to remove organics.
2. Classified and unclassified excavated materials shall not be removed from the site unless they are surplus to the requirements of the work and then only with the written approval of the Owner's Representative. Excess material not incorporated in the work and unsuitable material shall be transported to the Contractor's off-site disposal area. The Drawings indicate the extent of the excavation required.
3. The Contractor shall conform to the elevations and dimensions shown on the Drawings, within a tolerance of 0.10 feet for roads, parking areas, walkways, and 0.05 for building areas. Over excavation for the purpose of obtaining materials for use elsewhere in the work is not permitted without written approval.
4. The excavation shall be shaped to drain and shall be maintained in a dry condition, free of puddles or holes where water may accumulate. The Contractor shall plan his operation in a sequence that will provide drainage at all times. Any areas that cannot be so drained shall be kept free of standing water by pumping, if necessary.

5. Excavation shall be performed in a manner that will not endanger adjacent structures or improvements.
6. If hazardous materials of any kind are encountered in the excavation, Contractor shall immediately notify the Owner's Representative and stop excavation until the Owner has determined how to deal with it.
7. When permanently frozen soils are encountered, place fill or backfill materials in a timely manner, as directed, to minimize degradation of the foundation material. Do not place fill or backfill over seasonally frozen ground unless authorized in writing.
8. Thaw and drain frozen material deemed acceptable for fill before placing in the embankment. Frozen cuts may require stage excavation: remove thawed material and allow the cut to thaw while work continues on some other portions of the project. After the material in the cut has thawed to a sufficient depth, remove the thawed material. Repeat this operation until all frozen material is removed or the cut is excavated to grade.

B. Roadways, Parking Areas, Walkways

1. Excavation shall be carried to the subgrade elevations required for the placement of classified material and to such additional depths as required to remove all unsuitable material as directed by the Engineer.

C. Over Excavation

1. Over excavation shall be restored by the Contractor by backfilling with classified material and compacting to 95 percent of the maximum density at no cost to the Owner.

D. Stability of Sides

1. The Contractor shall slope the sides of excavations to the angle required for safety or shore and brace where sloping is not possible either because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in a safe condition until completion of backfilling by scaling, benching, shelving, or bracing. Take precautions to prevent slides or cave-ins when excavations are made in locations adjacent to backfilled excavations and when sides of excavations are subjected to vibrations from vehicular traffic or the operation of machinery or any other source. In all cases the sides of all excavations shall be constructed to satisfy the requirements set forth in the local, state, and federal safety regulations regarding shoring and slope angle.

E. Cold Weather Protection

1. The subgrade must be kept from freezing from the time earthwork begins until final acceptance of the work, unless specified otherwise in writing by the Owner's Representative.
2. All subgrade that is allowed to freeze shall be thawed and redensified to 95 percent of the maximum density by the Contractor at no expense to the Owner, unless specified otherwise in writing by the Owner's Representative.

3.03 Fill and Backfill

A. General

1. Fill and backfill consists of the placement of classified and/or unclassified material in layers to the required elevations.
2. All excavated materials meeting the requirements for classified and unclassified materials shall be incorporated into the work unless they are surplus to the requirements of the work and the Owner's Representative has given written approval not to use the material.
3. The Contractor shall keep all fills and backfill well shaped, drained, and maintained.

B. Roads, Parking Areas, Walkways

1. Fills and backfills shall be constructed of classified materials in all areas except as indicated on the Project Drawings.
2. The top six inches shall have a maximum particle size of 3 inches.
3. Fills and backfills shall be constructed in lifts of 12-inch maximum thickness, [six-inch maximum thickness if hand-operated compactors are used] and compacted to not less than 95 percent of maximum density. The finished surface of fills and backfills shall be smooth with no soft or yielding areas and shall be graded to not more than 0.05 feet above or below the design grade.
4. The Contractor shall backfill excavations as promptly as the work permits, but not until completion of the following:
 - a. Owner's acceptance of construction below finish grade such as culverts, subdrains, and other utilities.
 - b. Inspection, testing, approval, and recording locations of underground utilities.
 - c. Removal of shoring and bracing and backfilling of any resulting voids with satisfactory materials. Cut off temporary sheet piling driven below the bottom of structures and remove in a manner to prevent settlement of the structure or utilities; or leave in-place if required.
 - d. Removal of trash and debris.
 - e. Placement of permanent or temporary horizontal bracing on earth retaining walls.

C. Cold Weather Protection

1. The fill and backfill must be kept from freezing from the time earthwork begins until final acceptance of the work, unless specified otherwise in writing by the Owner's Representative.

2. All fill and backfill which is allowed to freeze shall be thawed and redensified to 95 percent of the maximum density by the Contractor at no expense to the Owner, unless specified otherwise in writing by the Owner's Representative.

3.04 Area Grading

- A. The top six inches shall have a maximum particle size of six inches. The fill material shall be placed in lifts of [12-inch maximum thickness][six-inch maximum thickness if hand-operated compactors are used] and shall be compacted to not less than 90 percent of maximum density. The finished surface of the fill shall be smooth with no soft or yielding areas and shall be graded to not more than 0.10 feet above or below the design finish grade. In those areas where the grade at the limit of grading is above or below the elevation of the adjoining natural surface, the design finish grade shall be maintained to the limit of grading and the edge of the cut or fill feathered off to make a smooth transition to the adjoining natural surface.

3.05 Measurement and Payment

- A. All work included under this section is incidental and shall not be measured separately.

END OF EARTH MOVING

SECTION 33 07 00 HDPE PIPE AND FITTINGS

PART 1 - GENERAL

1.01 Summary

- A. Utility piping shall be supplied as insulated pipe and fittings with heat trace channels and glycol heat trace piping as indicated on the Drawings for use in pressure pipe applications. The minimum service temperature range of all individual components and final products shall be -20 to 140°F unless otherwise specified. All pipe and fittings shall be capable of withstanding the cyclic freezing of water under its rated service pressure without breaks, leaks, gross deformities, or impaired service characteristics. The core pipe shall be factory insulated with polyurethane insulation and protected with an outer jacket of HDPE.
- B. This section covers HDPE piping and fittings used in the arctic piping system in the following services:
 - 1. Hot glycol designed for 50% to 60% propylene glycol in water. Verify compatibility of any new heat transfer fluids with existing fluids currently in use by the Owner prior to their use.
 - 2. Potable water.
 - 3. Sanitary sewer.
 - 4. Flushing and testing.
- C. All piping is above grade supported on either treated timber sleepers or helical pile supported steel framing except for short, buried sections used in road crossings, which are either direct bury crossings or are to be installed in a casing pipe. Locations where each type of support is used are shown in the Drawings.
- D. With the exception of owner procured materials, all additional HDPE pipe and fittings shall be from a single manufacturer who is fully experienced, reputable, and qualified in the manufacture of the HDPE pipe to be furnished. The pipe shall be designed, constructed, and installed in accordance with the best practices and methods standard to the industry and shall be in accordance with these specifications.

1.02 References

- A. The following specifications (current edition) are referenced in this document and shall be considered integral to this specification:

ASTM C177	Thermal transmission (guarded hot-plate apparatus)
ASTM C273	Shear properties of sandwich-core materials
ASTM C518	Thermal transmission (heat flow meter apparatus)
ASTM D1621	Compressive properties of rigid cellular plastics
ASTM D1622	Apparent density of rigid cellular plastics

- | | |
|------------|--|
| ASTM D2126 | Response of rigid cellular plastics to thermal humid aging (thermal dimensional stability) |
| ASTM D2837 | Obtaining pressure design basis for thermoplastic pipe products |
| ASTM D2842 | Water absorption of rigid cellular plastics |
| ASTM D3350 | Specification for Polyethylene Plastic Pipe and Fittings Materials |
| ASTM E398 | Water vapor transmission rate of sheet materials (dynamic relative humidity measurement) |
| ASTM E96 | Water vapor transmission of rigid cellular plastics |
| ASTM F2164 | Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems using Hydrostatic Pressure |
| ASTM F2620 | Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings |
| ASTM F714 | Polyethylene (PE) plastic pipe (SDR-PR) – based on outside diameter |
- B. American Water Works Association:
- | | |
|-----------|---|
| AWWA C651 | Disinfecting Water Mains |
| AWWA C653 | Disinfection of Water Treatment Plants |
| AWWA C901 | Service Polyethylene Pressure Pipe and Tubing, 1/2-inch through 3-inch for Water |
| AWWA C906 | Polyethylene Pressure Pipe and Fittings, 4-inch through 63-inch for Water Distribution and Transmission |
- C. National Sanitation Foundation:
- NSF/ANSI 14 – Plastic Piping System Components and Related Materials
- NSF/ANSI 61 – Drinking Water System Components – Health Effects
- D. Plastic Pipe Institute
- TR-33 – Generic Butt Fusion Joining Procedure for Field Joining of Polyethylene Pipe
- Plastic Pipe Institute (PPI) Handbook of Polyethylene Pipe, Chapter 2 – Inspections, Tests, and Safety Considerations
- E. Unless otherwise noted herein or on the drawings, all fittings shall be constructed utilizing core pipe of the same material, resin, and dimensions as that used for the core pipe of the straight lengths.

1.03 Submittals

- A. The Contractor shall furnish to the Engineer for approval one (1) electronic copy in PDF format of the submittals indicated below. No work shall commence on any item until the required shop drawing submittals have been approved. The submittals shall include:

1. Product Data: Submit manufacturer's standard printed information and literature for all materials to be incorporated in the work.
2. Shop Drawings: Submit dimensionally correct (scaled) shop drawings for all items to be fabricated prior to beginning fabrication.
3. Fabrication Procedures: Submit a written description of the methods/procedures to be used in fabricating the pipe and fitting.
4. HDPE Fusion Procedure Certifications (Butt Fusion and Electrofusion) for all personnel performing butt fusion and/or installing electrofusion couplings in the field on HDPE pipe. Contractor shall also submit evidence of experience for the installers of Fusions and Electrofusion Couplings.
5. Inspections and Testing of Pipe and Fittings:
 - a. Submit proposed hydrostatic testing procedure in compliance with ASTM F2164 for review and approval before any testing is undertaken.
 - b. Submit results of foam density tests on daily basis for all specified inspections and testing of pipe and fittings.
6. Quality Assurance program in accordance with section 1.04.
7. Laboratory Testing Results:
 - a. K-factor testing of insulation.
 - b. Core pipe/insulation bond
 - c. Density of insulation
 - d. Testing frequency shall be a minimum of one set of tests per 400 linear feet of pipe.

1.04 Quality Assurance

- A. The manufacturer shall be experienced and regularly engaged in the production of pre-insulated piping systems. The manufacturer shall understand the system design and its intent and shall produce components suitable to accomplish that intent. Any deficiencies in the Drawings or these Specifications which may jeopardize the performance of the system shall be brought to the immediate attention of the Engineer, prior to submittal of product description and information for acceptance, whenever possible.
- B. Engineer shall have open access to the fabrication facility and any sub-tier suppliers to assure conformance with the Specifications and quality of workmanship.
- C. The Contractor shall submit to the Engineer for approval a Quality Assurance program which incorporates as a minimum the following:
 1. A description of the method of manufacture.
 2. A description of the methodology for the quality assurance program.
- D. The Contractor shall implement the Quality Assurance program to assure compliance with all requirements of this Specification.

- E. A record of all tests which were performed shall be provided to the Engineer as required. (As a minimum, all test reports shall be submitted to the Engineer upon completion of work).
- F. Where a method of testing has not been specified, the Contractor shall submit detailed test procedures for approval by the Engineer.
- G. Any deficiency found in a stick of pipe shall be cause for rejection of the entire stick of pipe. All rejected pipe shall be replaced by the Contractor at no additional cost to the Owner.
- H. All insulated pipe and fittings supplied under this specification shall utilize the same manufacturer of core pipe. Contractor shall identify the core pipe manufacturer with his submittal. Additionally, since the City of Bethel procured pipe materials ahead of the construction project, the pipe material and fittings purchased by the Contractor must be compatible with the already acquired pipe.

PART 2 - PRODUCTS

2.01 No Lead Rule

- A. All pipe, fittings, and brass components in contact with potable water are to comply with Public Law 111-380 (No Lead Rule).

2.02 Core Pipe (Water Main, Low Pressure Sewer Main, Glycol Main):

- A. All core pipe shall be made of high-density polyethylene (HDPE) that conforms to all applicable provisions and requirements of the latest revision of AWWA C901 and AWWA C906 and, by inclusion, all appropriate standards referenced therein.
- B. HDPE Plastic Pipe shall possess the following characteristics unless otherwise specified, shown, or approved by the Engineer.
 - 1. Shall have a cell classification of 345434C per ASTM D 3350.
 - 2. Nominal pipe dimensions as given on the drawings shall have actual diameter dimensions in accordance with ASTM F714. All dimensions are Iron Pipe Size (IPS).
 - 3. Shall have a maximum standard dimension ratio (SDR) of 11.0 and a minimum pressure rating of 160 psi.
 - 4. Shall maintain a pressure rating equal or above 100 psig at 140 °F.
- C. All HDPE pipe used on the project shall have the same trade name. Additionally, the manufacturer shall certify that all HDPE pipe materials are compatible.
- D. All HDPE pipe and fittings shall be fabricated from virgin PE4710 resin.
- E. All HDPE pipe mains shall be butt fusion welded per ASTM F2620. Electrofusion joints are allowed for side taps or areas where butt fusion welding is physically impossible. All planned electrofusion joints shall be identified, and a list presented to the engineer for final approval prior to fusion.

2.03 Pipe Insulation

- A. Insulation between core pipe and outer jacket of all pipe and fittings shall be low-density rigid closed-cell polyurethane insulation with a nominal 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 insulation completely fills the annular space between core pipe and outer jacket and is free of defects affecting its intended purpose.
- B. Polyurethane insulation shall exhibit the following properties and characteristics specified by the referenced ASTM tests below.

ASTM C518 or C177, Maximum K-factor, as produced: $0.22 \text{ btu}\cdot\text{in}/\text{hr}\cdot\text{ft}^2\cdot^\circ\text{F}$

ASTM D1622, Core Density Range: $2.0 \text{ to } 4.0 \text{ lbs}/\text{ft}^3$

ASTM D1621, Minimum Compressive Strength: 40 psi (parallel and perpendicular to pipe axis)

ASTM D272, Maximum Water Absorption: 2%

ASTM D2126, Dimensional Stability: 2% (Maximum Linear Change)

- C. Exposed polyurethane insulation faces at pipe and fitting ends shall be coated to protect against physical damage, UV exposure during shipping and storage, and against water intrusion in service. The elastomeric coating shall be suitable for direct application over polyurethane insulation with no deleterious effects to the insulation or coating. The elastomeric coating shall be formulated for long-term service and retained flexibility over extended periods of exposure to sunlight, harsh weather, and saltwater spray. The strength of the adhesive bond of the coating to the insulation shall be greater than the tensile strength of the coating. In the event the coating is nicked or an edge is rolled up in handling, the coating that has been dislodged shall tear free from the coating still adhering to the insulation rather than pull the balance of the coating off as a sheet.
- D. All Federal and State regulations applicable to the type of insulation and its use shall be strictly adhered to.
- E. Insulation shall be placed into the pipe jacket by a single injection application. Fittings may be manufactured using one insulation injection for each open end of the fitting. In no case shall the jacket be drilled to perform, monitor, or inspect the injection. Pre-manufactured 4" arctic foam half-shells with rigid HDPE wrap, as described in 2.14, are the preferred method for joints and fittings.
- F. The maximum allowable void size is 0.05 in^3 (for reference, a $3/8$ -inch cube is $.05 \text{ in}^3$).
- G. Insulation and chemicals shall not contact the end or inside of the exposed core pipe.
- H. The electric element heat trace channel shall be secured to the outside of the core pipe, parallel to the pipe axis, prior to insulating. The channel shall be flush with the insulation faces at each end of the pipe or fitting, be free of insulation residue and foreign substances, and open to the minimum cross section specified.
- I. The elastomeric coating 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.

- J. The elastomeric coating material shall exhibit the following properties and characteristics:

ASTEM E398 or E 96 Maximum Water Vapor Permeance: 1.0 perm
Dry Film Thickness Range: 15 to 63 mils

2.04 Core Pipe/Insulation Bond

- A. Core pipe and fittings shall be bonded to the insulation with a minimum shear bond strength of 15 psi, or in such a manner as to produce insulation-to-insulation separation when a sample is tested in shear.
- B. The core pipe surface preparation will be performed in a manner that does not leave foreign material imbedded in the plastic. Gouges or scratches in the pipe surface that exceed the tolerance specified by the pipe manufacturer for the pipe pressure rating shall be cause for rejection.

2.05 Pipe Insulation Jacket

- A. Outer jackets for pipe and fittings shall be constructed of HDPE.
- B. The Contractor shall provide company name and production date (month and year) on the outer jacket of each pipe and fitting. Information shall be stamped onto the jacket with 1/8- inch to 1/4-inch-high lettering, within 8" of one end of the jacket.
- C. All surfaces of the outer jacket, including end-cuts and welds, shall be finished such that no jagged edges exist that could cause personal injury.
- D. The interior of the jacket shall be free of oils, grease, or other residue that could interfere with the adhesion of insulation to the outer jacket.

2.06 Electric Heat Trace Channel

- A. Electric heat trace channels shall be provided at a 45-degree angle from the bottom of the sewer service pipe, as indicated in the drawings.
- B. Heat trace channels shall be fully enclosed, in direct contact with the core pipe for its entire length, and there shall be no intrusion of insulation between the heat trace channel and the core pipe unless otherwise specified.
- C. Heat trace channels for all straight lengths of pipe shall be made of the same material as the pipe and shall be a semi-circle shape with inside dimensions of 1.5 inches and installed as shown on the drawings. The heat trace channel shall extend 2-inches past the insulation face of the pipe, with ends cleanly cut, square, smooth, and free from burrs or other protrusions that could interfere with installing the heat trace in the field.
- D. Heat trace channels installed along angular bends of fittings shall be constructed with 1.5-inch diameter flexible, liquid-tight PVC non-metallic conduit. Conduit material shall be nonconductive and non-corrosive, with a smooth interior surface that will maintain the internal diameter in tight radius bends. Conduit material shall be UL listed for outdoor use. A transition fitting shall be installed on all ends of heat trace channel that results in a channel protruding from the insulation face as specified for straight

pipe channel. All transition fittings shall be constructed with smooth interiors, free from burrs or other protrusions that could interfere with installing the heat trace in the field, as shown in the drawings.

- E. Pieces of heat trace channel to fit within the joint area (jumpers) shall be provided with each piece of pipe and with each fitting. The jumpers must be sized to slip snugly over the outside of the specified straight pipe heat trace channel with an overlap of not less than 1 ½- inches on each side after a typical field fusion of individual lengths of pipe.

2.07 Glycol Heat Trace Channel

- A. Glycol heat trace channels shall be provided on the bottom of the main pipe.
- B. Channels shall be constructed of virgin PE4710 and shall be in direct contact with the core pipe for its entire length with no intrusion of insulation between the channel and the core pipe unless otherwise specified.
- C. Channels shall be sized as shown in the drawings. Alternate shapes can be submitted to Engineer for approval.

2.08 Service Pipe (Water, Sewer and Glycol)

- A. Service pipes are placed in arctic insulated carrier pipe. See drawings for sizes and configuration for the different water, sewer, and glycol service sizes and carrier pipe sizes.
- B. HDPE pipe shall be constructed of virgin PE4710 resin. All design drawings are based on DR11 HDPE piping.
- C. For gravity sewer service pipe only, PE3408 HDPE DR17 with Harco fitting shall be allowed.

2.09 Fittings

- A. Fittings
 - 1. All molded fittings and fabricated fittings shall be fully pressure rated to match the pipe DR pressure rating to which they are made. All fittings shall be molded or fabricated by the manufacturer. No Contractor fabricated fittings shall be used unless approved by the Engineer.
 - 2. Fittings and specials shall have the same trade name or be manufactured by the same manufacturer as the HDPE pipe being supplied. The manufacturer shall certify that the fitting material is compatible with the pipe material.
 - 3. Heat Fusion Joints shall comply with ASTM F2620.
 - 4. Transition Fittings (change in pipe materials) for fittings larger than 2" shall be Victaulic (or Engineer approved equal) style clamp couplings. The style number shall be appropriate for the service using pipe manufacturer's recommended fitting for the pipe materials and sizes being used. Style 904 HDPE to Flanged, style 907 HDPE to steel, and series 2971 HDPE to PVC are all pre-approved.
 - 5. All nuts and bolts shall be Type 316 stainless steel.

6. All transitions from HDPE pipe to other pipe materials and valves shall be made per the HDPE pipe manufacturer's recommendations and specifications. A molded flange connector adapter with 316 stainless steel back-up ring assembly or Victaulic (or Engineer approved equal) style 907 adaptor shall be used for pipe type transitions. No solid sleeves shall be allowed between material transitions. Flanges shall be ANSI Class 125.

B. Fabricated Fittings

1. All fusion joints used in fabricated fittings shall be documented by a computer that records pressure and temperature applied at each fused joint. Computer printouts and electronic data for each fitting shall be made available to the owner upon request. The Contractor shall ensure that each joint is fused at the temperature and pressure recommended by the pipe manufacturer in order to achieve the maximum pressure rating for that joint.
2. All fittings for each project shall be labeled with a unique identifier that corresponds with the fusion computer printouts for each fitting.

2.10 HDPE Pipe and Fitting Manufacturing and Dimensional Tolerances

- A. Allowable offset of the centerline of the outer jacket and core pipe shall be not more than 1/4-inch at the pipe ends. Elsewhere along pipe lengths the centerline offset shall not be greater than 3/8-inch.
- B. The minimum temperature of all components used to manufacture pipe and fittings shall be 50 °F at the start of fabrication. The fabricated pipe shall be placed in a facility maintained at a temperature of 50 °F or greater for a minimum of 12 hours after fabrication.
- C. All elbows shall have a bend radius as specified in the drawings with a tolerance of + 2 degrees without reversion. All elbows must maintain normal outside diameters along their entire length without tolerance as per ASTM-F714.
- D. All branches of fabricated fittings must lie in a single plane with a maximum deviation of + 2 degrees.
- E. The length of core pipe protruding from the insulation on the ends shall be 12 inches + 1/4 -inch. The core pipe ends shall be smooth and oriented perpendicularly to the core pipe longitudinal axis + 1/8-inch.
- F. The outer jacket shall be cut in one pass perpendicular to the length of the jacket + 1 degree. The heat trace channels shall be flush with the insulation and outer jacket. The insulation profile of the coated ends shall not exceed a relief deviance of + 1/4-inch across the face.

2.11 HDPE Pipe and Fitting Production and Inspection

- A. Only finished pipe lengths and fittings that meet the requirements of these specifications and drawings shall be used for destructive testing. Should any product fail to meet the visual quality control specifications listed below, that product shall be either re-built to meet the specifications or rejected. Only those products that meet all

visual quality control specifications shall be considered final products suitable for receipt by the Owner or for laboratory or other destructive testing.

1. Visual Quality Control:

- a. Dimensional Tolerance: Each length of pipe and each fitting will be examined by the Contractor for off-set tolerances, insulation cut-back distances, exposed insulation face alignment and relief profile, and alignment and smoothness of core pipe ends.
- b. Insulation Integrity: Completed pipe and fitting ends shall be inspected for voids in excess of 0.05 in³ or discontinuities by the Contractor prior to coating. Any glazing left on the uncoated pipe end from the forms used during the insulating operation shall be removed before coating.

2. Laboratory Testing

- a. The density and K-factor shall be measured on insulation specimens of the appropriate size and under the specified conditions as set forth in the applicable ASTM test. Insulation specimens shall be retrieved by cutting a 12-inch section of insulated pipe from a production sample. The remaining length shall be trimmed to the dimensional tolerances of this specification to allow Owner use of that pipe section.
- b. Should the Contractor choose to test the "K" factor as outlined in ASTM C518, the testing apparatus shall be calibrated within 24 hours of the test using a calibration standard certified accurate by the National Bureau of Standards (NBS). The "K" factor test sample shall be removed from the insulated pipe, prepared for testing, and left open to the atmosphere at 70°F for a minimum of 24 hours prior to testing.
- c. In addition to the testing identified above, the following tests shall be performed to verify the quality of the finished product:
 - 1) Core pipe/insulation bond:
 - a) Two 6-inch lengths of cured insulated pipe shall be cut from one uncoated insulation face end of completed pipe length. The remaining length shall be trimmed according to the dimensional tolerances of this specification and coated to allow Owner use of that pipe section.
 - b) One specimen shall be tested at +70°F. The other specimen shall be brought to -20°F in 4 hours or less and remain there for at least 24 hours before testing. Acceptance will be indicated by a minimum shear bond strength of 15 psi and insulation-to-insulation (or insulation-to-insulation pipe surface film) separation or tearing.

2.12 HDPE Pipe and Fitting Packing

- A. The core pipe ends of all pipe and fittings shall be capped with PE pipe caps (Caplugs or approved equal) and the plugs taped to the pipe with black electrical tape (such as 3M #33+) or other approved tape after final inspection and prior to shipment. Duct tape shall not be used to secure the PE pipe caps to the pipe spigot ends.

- B. Pre-insulated pipe shall be packed in bundles with a maximum gross weight of 4,000 pounds per bundle unless otherwise specified by the Owner. The end geometry of each bundle shall be rectangular. Each layer of pipe within the bundle including the bottom layer shall rest upon a minimum of 3 each 4-inch x 4-inch cross cleats banded to that individual layer using 1 1/4-inch steel strapping. All cleats shall feature a 45-degree stop block at least nominal 4-inches high by 4- inches long fastened securely to both ends of the cleats to prevent the pipe from rolling off the cleat when the banding is cut. The outer cross cleats shall be installed between 1 to 2-feet from the insulation face of the pipe ends with the middle cleat centered on the bundle. In addition, 1 1/4-inch steel straps shall securely fasten all the layers together to form a complete bundle. Bundles 5 pipes wide by 5 pipes high are recommended.
- C. All fittings and couplings shall be packaged in crates sheathed with minimum 1/2-inch sheathing not to exceed 4 ft x 4 ft x 8 ft. Minimum nominal 2-inch x 3-inch framing members shall be installed in all corners of the crate and fastened securely to the sheathing. On crates longer than 6- feet, framing members shall be installed along the shorter centerline of all the 4 long panels. The framing members shall be securely fastened to each other and to the sheathing. For crates 4-feet long or less, 2 each 4-inch x 4-inch cleats shall be installed on the bottom edges of the crate to provide for forklift handling. For crates longer than 4-feet, 3 cleats shall be installed, with the middle cleat centered on the crate. These cleats shall be fastened through the bottom sheathing and also banded to the crate with 1 1/4-inch-wide steel bands that wrap around the entire crate. The crates shall be designed to stack 3 crates high, provide protection to the contents during rough ocean, air freight transport, and on-site handling without damage.

2.13 HDPE Pipe and Fitting Final Inspection

- A. After completion of the quantity of pipe and fittings contracted for, the Owner may perform a final inspection at the fabrication point. The certified results of all required laboratory tests made during production by the Contractor shall be made available in report form at this time. During the final inspection, the product packing will be inspected to see that all specifications listed in section 2.11 have been met. Should any of the packing fail to meet the specifications, the Contractor shall re-pack the pipe to meet the specifications.

2.14 Joint Insulation Kit

- A. Joints between segments of insulated pipe and fittings shall be installed using 4" thick foam half-shells.
- B. After installing, foam half shells shall be covered by a protective HDPE sleeve. Where an owner-provided metal-jacketed pipe joins an HDPE-jacketed pipe, heat shrinkable sleeve specifically designed for pipes made of HDPE, Canusa K-60 or approved equal is acceptable.
- C. Joint kits shall include half shell foam insulation and rigid wrap or heat shrink to field fabricate the pipe joint.

- D. Joint kits shall be sized for 16-inch cut back (8 inches for each pipe) and 8-inch jacket overlap (4 inches for each pipe) for a total joint sleeve length of 24 inches.
- E. Manufacture to fit the fitting or the pipe joint.

2.15 Pipe Identification

- A. The following shall be continuously indent printed on the pipe or spaced at intervals not exceeding 5-feetca.
 - 1. Name and/or trademark of the pipe manufacturer.
 - 2. Nominal pipe size.
 - 3. Dimension ratio.
 - 4. The letters PE followed by the polyethylene grade in accordance with ASTM D1248 followed by the hydrostatic design basis of the piping.
 - 5. NSF-61 for all NSF-61 certified piping.
 - 6. A production code from which the date and place of manufacture can be determined.

2.16 Electrofusion Couplings

- A. Electrofusion couplings should be avoided for fusion of HDPE pipe mains. Electrofusion couplings are allowed for branch service lines or where required in the 3" glycol circulation main in cases where butt fusion is not physically possible. Where required, couplings shall be installed by a certified technician. Electrofusion couplings shall be approved by pipe manufacturer to which they will be bonded.
- B. One-piece construction, tubular, and same material as the adjacent HDPE pipe.
- C. Couplings shall have attached around the circumference at each end a fusion wire which when energized shall provide a complete watertight fusion weld.
- D. Fusion weld wires are factory attached and with sufficient lead for connection to factory supplied power converter.
- E. Couplings shall be capable of sustaining test pressure without damage. Contractor shall supply one extra coupling per four installed for future use by Owner.
- F. Electrofusion couplings shall not be used for outer jacket sleeves or to repair damaged piping.
- G. Installation of coupling shall be in accordance with manufacturer's written instructions and using manufacturer's recommended tools and materials.

2.17 Valves

- A. Water Circulation Loop In-Line Isolation Ball Valves
 - 1. Valves for HDPE water mains shall be polyethylene ball valves suitable for use with piping complying with AWWA C901 and AWWA C906 as applicable.

- a. Valves 2-inches and smaller shall have an integral stainless-steel valve stem. Valves larger than 2-inches shall have polyethylene valve stem.
 - b. Valve body shall be fully fused with no metal internal parts.
 - c. Valve shall provide full port through opening, with no flow obstructions, when in open position.
 - d. Valves shall be rated for full pressure rating of connecting pipe, 160 psi minimum.
 - e. Valves 8" and larger shall have gear operators.
 - f. Install valves using butt-fusion.
2. Valves shall be NSF/ANSI 61 certified for use with potable water.
 3. Install in main loop only for isolation as shown on plans.
 4. Manufacturer: Polyvalve, Poly-Water Valves or approved equal.
- B. Water Circulation Loop Gate Valves
1. Gate valves shall be iron body, fully bronze-mounted, double disc, parallel seat valves as manufactured by Mueller Company or approved equal and in accordance with AWWA Specification C-500-93 or C509-01. All valves shall have non-rising stem, an O-ring seal, a handwheel operator, and open counterclockwise. Valves shall have welded flanges.
 2. Gate valves are required at fire hydrants for isolation. See drawing details for location and quantity.
- C. Sewer Lateral Valves
1. Valves for HDPE sewer laterals shall be polyethylene ball valves suitable for use with piping complying with AWWA C901 and AWWA C906 as applicable.
- D. Sewer Main Isolation Ball Valves
1. Valves for HDPE sewer mains shall be polyethylene ball valves suitable for use with piping complying with AWWA C901 and AWWA C906 as applicable.
 2. Valves 2-inches and smaller shall have an integral stainless-steel valve stem. Valves larger than 2-inches shall have polyethylene valve stem.
 3. Valve body shall be fully fused with no metal internal parts.
 4. Valve shall provide full port through opening, with no flow obstructions, when in open position.
 5. Valves shall be rated for full pressure rating of connecting pipe, 160 psi minimum.
 6. Valves 8" and larger shall have gear operators.
 7. Install valves using butt-fusion or flanged connections.
 8. Install in sewer main only for isolation as shown on plans.

9. Manufacturer: Polyvalve, Poly-Water Valves or approved equal.

2.18 Hydrants

- A. Fire hydrants shall be as shown on Construction Drawings or Approved Equal and shall conform to AWWA Specification C-502-94, "Dry Barrel Fire Hydrants." All connections shall be mechanical joint unless otherwise approved by Owner's Representative.
- B. All "single pumper" hydrants shall have two, two- and one-half inch hose connections and one four and one-half inch pumper connections. All "double pumper" hydrants shall have one, two- and one-half inch hose connection and two four and one-half inch pumper connections. All hose threads shall be National Standard threads. The working parts of all fire hydrants shall be bronze or non-corrodible metal.
- C. Painting and coating shall be in accordance with the cited AWWA specifications for dry barrel fire hydrants Section 4, Article 4.2 (Paint). Color of paint shall be red.
- D. The adjustment of hydrant barrel and valve box to the required finish grade will be at the expense of the Contractor.
- E. All hydrants shall have drain outlets at the base of the barrel. Plugs shall be removed prior to installation.
- F. Fittings for hydrants shall be Ebba Iron Megalug, Victaulic Style 907, flanged class 125, or Engineer Approved Equal. Fittings shall be fully restrained.
- G. Gate valve(s) shall be provided for isolation. Handwheels shall be provided for all gate valves.

PART 3 - EXECUTION

3.01 General

- A. Connections to the Bethel Heights Water Treatment Plant shall be coordinated with the Owner's Representative and the Owning Utility before any shutdown of existing water facilities. Maximum allowable shutdown time shall be four hours. All shutdowns shall be approved and coordinated with the City of Bethel. Public notice (if required) shall be given a minimum of 24 hours before shutting down.

3.02 Construction Staking

- A. The Contractor shall furnish the construction staking.
- B. Horizontal distances are from center to center of fitting or appurtenances unless otherwise noted.
- C. Contractor furnished survey shall be done by a qualified and registered surveyor. The Contractor shall provide a competent surveyor to maintain line and grade during all pipe-laying operations with a transit and engineer's level at no additional cost to the Owner. Accurate survey notes shall be kept in accordance with accepted survey practice. A copy of these notes shall be given to the Owner's Representative as part of

the record drawing submittal.

3.03 Water Removal

- A. During any required excavation for road or access crossings, the Contractor shall remove by pumping or other approved means all water above the bottom of the trench. Contractor shall obtain all permits necessary for dewatering.

3.04 Utility Mains

- A. Install water mains on helical pile supported steel foundations or proposed timber foundation supports unless in casing pipe or direct bury.
- B. For casing pipes and in direct bury applications, minimum cover shall be as shown on the plans to the outside diameter of the pipe. The excavation and backfill as specified in Section 31 20 00 Earth Moving.
 - 1. Backfill Material shall be two inches maximum size within one foot surrounding the pipe. The Contractor shall carefully place and thoroughly compact backfill around and above pipe to minimum 95 percent density.
 - 2. After the lines have been inspected, the trenches shall be backfilled. Backfill may be accomplished prior to testing at the Contractor's risk.
 - 3. Restore surface to its original elevation or finished grade as shown on the Plans.
 - 4. Marking tape 12" above main shall be installed in direct bury installation.
- C. Contractor shall work around, support and protect existing water and sewer mains and services as required to complete the Work.
- D. Contamination Prevention:
 - 1. Contractor shall take particular care to keep potential sources of contamination from collecting around water mains and services.
 - 2. Adequate provisions shall be made to direct surface flows and other sources of potential contamination away from the work area during construction.

3.05 Core Pipe Fusion

- A. Pipe shall be protected during handling against impact shocks and free fall, and the pipe interior shall be free of extraneous material.
- B. Each pipe shall be laid accurately to the line and grade shown on the Drawings. Pipe shall be laid and centered so that the sewer has a uniformly sloping invert. As the work progresses, the interior of the water or sewer shall be cleared of all superfluous materials.
- C. Before making pipe joints, all surfaces of the portions of the pipe(s) to be joined shall be clean and dry. Lubricants, primers, and adhesives shall be used as recommended by the pipe manufacturer. The joints shall then be placed, fitted, joined, and adjusted so as to obtain the degree of water tightness required.

- D. Pipe cutting, where necessary, shall be done in a neat and workmanlike manner without damage to the pipe. Unless otherwise authorized, cutting shall be done by means of an approved type of mechanical cutter. Wheel cutters shall be used when practicable.
- E. Polyethylene Pipe: Installations and cutting of polyethylene pipe shall be in accordance with ASTM F2620, thermal butt-fusion, in strict conformance with the manufacturer's recommendations, and as detailed hereinafter.
 - 1. Butt-fusion joining of pipe and fittings shall be performed in accordance with the procedures established by the pipe manufacturer. Joining must be conducted by personnel possessing the qualifications and certifications specified below.
 - 2. Butt-fusion joining of pipe and fittings shall be performed on fusion machinery approved by the pipe manufacturer. Fusion pressures, temperatures, and cycle times shall be according to pipe manufacturer's recommendations. No pipe or fittings shall be joined by any individual, unless they are adequately trained and qualified in the technique involved.
 - 3. Joining sites shall be cleared and graded, if necessary, to provide enough space for pipe storage and fusion. The site shall be free of rocks, stumps, and debris which would cut, scar or gouge the pipe. The fusion machine must be mounted on a level, stable base (e.g. three- fourth inch-plywood secured on level ground) or on a sled of a design approved by the pipe manufacturer. To allow the joining operation to continue in adverse weather conditions, a shelter shall be built for the joining machine.
 - 4. When joining new HDPE pipe to the existing sewer piping which consists of various undetermined materials, the Contractor shall use the adapters, connectors, couplings, etc. recommended by the HDPE pipe manufacturer as submitted to the Owner's Representative 30 days prior to installation.
 - 5. Where polyethylene is installed below grade, a detectable underground marking tape shall be installed in the pipe trench parallel and two feet above the top of the pipe.
 - 6. All joints shall be labeled with a unique identifier that corresponds with the fusion computer printouts for each fitting. The joint number and location shall be recorded on the record drawings
 - 7. Each joint shall be documented by a computer that records pressure and temperature applied at each fused joint. Computer printouts and electronic data for each joint shall be made available to the owner or inspector upon request. The Contractor shall ensure that each joint is fused at the temperature and pressure recommended by the pipe manufacturer in order to achieve the maximum pressure rating for that joint.
- F. Polyethylene Fusion Technician Qualification: The Contractor is responsible for the butt-fusion joints done by his organization and shall provide for the instruction, testing, and installation training sessions as required to obtain for his personnel, including quality control personnel, a polyethylene fusion certification and authorization issued by the manufacturer of the supplied polyethylene piping. Only certified and authorized personnel will be allowed to perform the installation, supervision or inspection of

- polyethylene-fusion joints. All Contractor personnel performing installation, supervision or inspection of polyethylene fusion joints shall undergo training and certification or recertification prior to beginning work on HDPE pipe. The certificate and authorization for polyethylene fusion shall be submitted to the Owner's Representative prior to any installation or work on HDPE pipe. The Contractor shall make all training sessions available to Government inspectors and quality assurance personnel at no charge to the Government and shall schedule the training sessions at a date and time agreeable to the Owner's Representative's representative.
- G. Training: The manufacturer shall assist the Contractor by training and instructing the Contractor's personnel in proper polyethylene pipe installation procedures and fusion techniques. Certification will be required in writing from the manufacturer or manufacturer's representative listing the names of those persons so qualified. The manufacturer's representative shall be a person regularly engaged in such service and shall be certified in writing by the manufacturer to be technically qualified and experienced to supervise and conduct the training. The training shall include a classroom/lab type of instruction in which personnel being certified are instructed in properties of HDPE Pipe and the proper procedures for jointing, fusion, and installation. All personnel shall be required to operate fusion equipment and become proficient at joining HDPE pipe of the various wall thicknesses and diameters being installed on this project.
- H. Inspections: All new lines shall be left fully exposed and accessible until inspected and approved by the Owner's Representative.

3.06 Joint Insulation Kits

- A. Construct all piping, heat trace channels, and glycol heat trace before installing joint insulation kits.
- B. The City procured pipe may have damage to the insulation at the ends of the pipe. Contractor is to spray foam the damaged ends to make insulation seamless when joint kits are installed.
- C. Joint insulation kits shall only be installed on piping that has passed hydrostatic pressure test in this specification.
- D. 4" wide half shells with engineer-approved rigid HDPE sleeve are preferred by the City. Heat shrink wrap is acceptable with engineer's approval.

3.07 Glycol Pipe Installation

- A. Installation shall conform to all manufacturers' instructions and the Plastic Pipe Institute Handbook of Polyethylene Pipe, latest edition.
- B. Two-inch glycol HDPE pipes shall be installed in an arctic piping system as indicated on the Plans. The installation will be complex, and the Contractor is instructed to review the plans carefully and plan out the work in advance to ensure all required materials and tools are available at the time of construction. The 2" glycol main transitions between the water and sanitary sewer mains at multiple points in the loop.

- C. Installer shall be trained and certified by the manufacturer for fusion of HDPE pipe as previously described.
- D. Contractor to fill glycol loop with Dowfrost 50% propylene glycol per manufacturer's recommendations. Coordinate with plant operators.

3.08 Flushing

- A. The Contractor shall submit his plan for flushing to the Engineer for review and approval at least 10 days before starting flushing.
- B. The Contractor shall notify the Engineer a minimum of 48 hours before actually beginning the field flushing.
- C. A representative of the Owner and Contractor shall be present for all flushing and testing.
- D. Before the pressure or leakage tests are performed and before the system is sterilized, all newly laid mains shall be thoroughly flushed to remove all foreign materials. The Contractor shall provide for "open bore" flushing at each end of the system so that all parts will be cleaned. Flushing times shall be at the discretion of the Owner and utility. The Contractor will use the method in AWWA C651-14 "Disinfecting Water Mains". Hydrants shall be flushed after the full bore flush to remove debris from the hydrant runs.
- E. In the event repeated flushing is necessary to approve and certify the system, such flushing shall be done at the expense of the Contractor.

3.09 Testing

- A. Pressure testing shall be conducted per Manufacturer's recommendations and as approved by the Engineer.
- B. The Contractor shall submit his plan for testing to the Engineer for review and approval at least 10 days before starting testing.
- C. The Contractor shall notify the Engineer a minimum of 48 hours before actually beginning field testing.
- D. All HDPE mains shall be field-tested. Contractor shall supply all labor, equipment, material, gages, pumps, meters, and incidentals required for testing. Pressure testing shall be completed once all service connection boxes have been assembled and with all water and sewer service isolation valves fully closed.
- E. Water Main
 - 1. All water mains shall be tested to 120 psi with 73°F or lower water unless otherwise approved by the Engineer.
 - a. Should a leak be found in a section of existing piping that was not modified during Contractor's operations, coordinate with Engineer to determine method for repairing the damaged piping. Owner will pay for cost of repairs.
 - b. Should a leak be found in a section of new piping or at a new joint in a

section of existing piping the damaged piping shall be repaired at the Contractor's expense.

2. Pressure testing procedure shall be as follows:
 - a. Restrain pipeline against movement in event of catastrophic failure. Leave joints exposed for leakage examination.
 - b. Isolate section of piping to be tested.
 - c. Fill line slowly with water. Maintain flow velocity less than 2 feet per second.
 - d. Expel air completely from the line during filling and again before applying test pressure. Air should be expelled by air release valves.
 - e. Pressurize pipeline to test pressure and add make-up test water as required to maintain maximum test pressure of 120 psi for four hours.
 - f. After four-hour expansion phase, reduce pressure by 10 psi to target test pressure of 110 psi.
 - g. The final test pressure shall be within 5% of the target pressure at the end of one hour.
 - h. Upon completion of the test, the pressure shall be bled off from a location other than the point where the pressure is monitored. The pressure drop shall be witnessed by the Engineer at the point where the pressure is being monitored.
3. If the final test pressure is within 5% of the target test pressure at the end of the test period and there are no visual leaks the installed pipe shall be considered to have passed.
4. All visible leaks are to be repaired regardless of the amount of leakage.

F. Glycol Heating Loop

1. All glycol mains shall be tested to 100 psi with 80-90°F water or glycol solution unless otherwise approved by the Engineer.
 - a. Should a leak be found in a section of new piping or at a new joint in a section of existing piping the damaged piping shall be repaired at the Contractor's expense.
2. Pressure testing procedure shall be as follows:
 - a. Leave joints exposed for leakage examination. Pipe shall be tested after inserting into glycol heat trace channel.
 - b. Isolate section of piping to be tested.
 - c. Fill line slowly with water. Maintain flow velocity less than 2 feet per second.
 - d. Expel air completely from the line during filling and again before applying test pressure. Air should be expelled by air release valves.
 - e. Pressurize pipeline to test pressure and add make-up test water or glycol solution as required to maintain maximum test pressure of 100 psi for four hours.

- f. The final test pressure shall be within 5% of the target pressure at the end of one hour.
 - g. Upon completion of the test, the pressure shall be bled off from a location other than the point where the pressure is monitored. The pressure drop shall be witnessed by the Engineer at the point where the pressure is being monitored.
- 3. If the final test pressure is within 5% of the target test pressure at the end of the test period and there are no visual leaks the installed pipe shall be considered to have passed.
- 4. All visible leaks are to be repaired regardless of the amount of leakage.

G. Sewer Main

- 1. All sewer mains shall be tested to 45 psi unless otherwise approved by the Engineer.
 - a. Should a leak be found in a section of existing piping that was not modified during Contractor's operations, coordinate with Engineer to determine method for repairing the damaged piping. Owner will pay for cost of repairs.
 - b. Should a leak be found in a section of new piping or at a new joint in a section of existing piping the damaged piping shall be repaired at the Contractor's expense.
- 2. Pressure testing procedure shall be as follows:
 - a. Restrain pipeline against movement in event of catastrophic failure. Leave joints exposed for leakage examination.
 - b. Isolate section of piping to be tested.
 - c. Fill line slowly with water. Maintain flow velocity less than 2 feet per second.
 - d. Expel air completely from the line during filling and again before applying test pressure. Air should be expelled by air release valves.
 - e. Pressurize pipeline to test pressure and add make-up test water as required to maintain maximum test pressure of 45 psi for one hour.
 - f. The final test pressure shall be within 5% of the target pressure at the end of one hour.
 - g. Upon completion of the test, the pressure shall be bled off from a location other than the point where the pressure is monitored. The pressure drop shall be witnessed by the Engineer at the point where the pressure is being monitored.
- 3. If the final test pressure is within 5% of the target test pressure at the end of the test period and there are no visual leaks the installed pipe shall be considered to have passed.
- 4. All visible leaks are to be repaired regardless of the amount of leakage.

3.10 Disinfection and Testing

- A. Refer to Section 33 13 00 for water pipe disinfection procedures.

3.11 Existing Utilities

- A. Contractor is responsible for the protection of all existing underground, surface and overhead utilities, and for the protection of adjacent structures. Plan locations of existing underground facilities are to be considered approximate only and shall be verified with the owning utility by the Contractor. The methods used to protect existing utilities, appurtenances, structures, etc. shall be subject to the approval of the Owner. Any damage to existing utilities should result in a stop-work and immediate repair completed to the satisfaction of the Owner and the Utility, at the expense of the Contractor.

3.12 Record Drawings

- A. Contractor shall provide staking notes and a redlined drawing prior to final payment showing record information on the following:
 - 1. Horizontal location and elevation at least every 50 feet along the pipe and of all tees, bends, changes in grade, and end of the dead-end runs.
 - 2. Horizontal location for all valves and change in pipe size or class. In addition to stationing, location of valves shall also be shown by three swing ties from each valve to appropriate prominent features. Swing ties shall not exceed 100 feet in length without the written consent of the Owner's Representative.
 - 3. Horizontal and vertical location of electrofusion couplings, air releases, drain valves, repairs to leaks during testing or damaged section of pipe, and hydrants.
 - 4. Accurate detail and location of any unique tie-ins, special combination of fittings, etc.
 - 5. On service pit orifices, show station on mainline for corporation stop, length and size of service line, location of pit orifices by two and more swing ties and station and offset to terminus. Swing ties to be as close to 90 degrees to one another as possible and shall not exceed 100 feet in length. Swing Ties will be made to prominent permanent features such as building corners.
 - 6. If adequate record data is not provided as defined above, the Owner may perform an as-built survey and deduct the cost from monies due the Contractor.

END OF HDPE INSULATED PIPE AND FITTINGS

SECTION 33 12 13

WATER AND SEWER SERVICE CONNECTIONS

PART 1 - GENERAL

1.01 Summary

A. Section Includes:

1. Pipe and fittings for domestic water and sewer service connections to buildings.
2. Valves
3. Corporation stop assemblies
4. Pit orifices assemblies

1.02 Reference Standards

- A. ASTM F-1005 - Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene and Crosslinked Polyethylene (PEX) Pipe and Tubing
- B. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
- C. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 in. through 3 in., for Water Service
- D. AWWA C906 - Polyethylene Pressure Pipe and Fittings, 4-inch through 63-inch for Water Distribution and Transmission
- E. NSF/ANSI 61 – Drinking Water System Components – Health Effects
- F. NSF/ANSI 372– Drinking Water System Components – Lead Content

1.03 Submittals

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data on valves, pit orifices, corporation stops, meters, meter setting equipment, service saddles, backflow preventer, and accessories.
- C. Shop drawings for each size of composite pipe and each size/style of fitting indicating compliance with this Section.

PART 2 - PRODUCTS

2.01 Water and Sewer Piping and Fittings

- A. See Specification 33 07 00 HDPE Insulated Pipe and Fittings

2.02 Service Saddles

- A. Service saddles for connection to mains shall be electrofusion branch saddles designed and manufactured in accordance with ASTM F-1055.
- B. Branch saddles shall be produced from pre-blended virgin resin that has a PPI listing of PE3408 in accordance with ASTM D3350. The resin shall be listed by NSF 61 for use with potable water.
- C. Manufacturer: Georg Fischer, Central Plastics, or approved equal.
- D. Provide saddles with female pipe thread (FPT) taps for attachment of corporation stops.

2.03 Ball Valves

- A. Ball valve shall be threaded lead-free brass ball valve, Nibco T-FP-600A-LF-LL or approved equal. Valve shall be NSF/ANSI 61 and NSF/ANSI 372 certified. Valve shall have a locking lever handle capable of being locked with a padlock.
- B. Valves 2-inches and smaller shall have an integral stainless-steel valve stem.

2.04 Pit Orifices

- A. Minimum $\frac{3}{4}$ " pitorifice required for all water service connections. See drawings for details.
- B. Ford, or other preapproved manufacturer.

2.05 Corp Stop

- A. Corporation stops are required for all service connections. See drawings for details.
- B. Corporation stops must comply with AWWA C800.
- C. Preapproved manufacturer: Ford
- D. Provide corp stops with male iron pipe thread (MIPT) taps by pack joint for attachment of corporation stops.
- E. Stainless steel insert stiffeners required for service pipe connections.

PART 3 - EXECUTION

3.01 Examination

- A. Verify building service connections and water service size, location, and invert are as indicated on Plans.

3.02 Service Connections

- A. Most service connections at the building will consist of connecting the household plumbing to the new service piping as shown on the details in the drawings. Several configurations of plumbing exist and access to the tie-in point will depend on the house configuration. The general approach for a water tie-in will be to tie-in to the existing plumbing between the existing water circulation pump and the filter or hot water tank.

The general approach for a sewer tie-in will be to tie into the existing plumbing before (upstream of) the holding tank. The following paragraphs outline various scenarios, along with acceptable construction approaches for alternative water and sewer service house connections:

1. The existing water tank is located outside of the building and the water service penetrates through the exterior house wall.

Install a new carrier pipe from the mains to the grinder pump assembly. Install a tee for the water service outside of the grinder pump assembly. Open the existing water service pipe just outside the building. Run the new water service from the tee in the shared carrier to the exposed existing water service line. Run the PEX tubing and connect to the interior water lines. Install heat trace for both the HDPE service run and the PEX service run. Bundle any unprotected lines, wrap with 6 mil plastic wrap, and neatly spray foam the exposed section with a minimum of 4" insulation thickness. Coat the spray foam with polyurethane.

2. The existing water tank is located inside of the building.

The new carrier pipe should be hung from the underside of the house. If the building does not have adequate space to hang the pipe underneath, install the carrier pipe as agreed upon with the homeowner (possibly on the ground or through the existing water fill wall penetration). Install heat trace for both the HDPE service run to the main and the PEX service run into the house. Bundle any unprotected lines, insulate with spray foam, and wrap with heat shrink.

- B. If the existing plumbing cannot work, or where a better tie-in point is identified, construct the new carrier pipe and service lines to a location determined most feasible by a plumber to connect to re-plumbed interior piping.

3.03 Installation - Ball Valve Assembly

- A. Make connection for each different kind of water main using suitable materials, equipment and methods approved by the Engineer.
- B. Provide service saddles for all connections to HDPE mains.
- C. For HDPE mains, exercise care against crushing or causing other damage to water mains or sewer mains at time of tapping or installing electrofusion saddle or valve.
- D. Use proper seals or other devices so no leaks are left in water or sewer mains at points of tapping.
- E. Service taps shall be at 12 o'clock position on the water or sewer main or as indicated in the Drawings.

3.04 Installation – Service Pipe and Fittings

- A. Houses shall not be without water service for more than 72 hours. During this time, the Contractor shall provide potable water to all residents without water service.
- B. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- C. See 33 07 00 HDPE Insulated Pipe and Fittings for pipe installation.

- D. Install access fittings to permit disinfection of water system performed under Section 33 13 00 Disinfecting of Water Piping.

3.05 Service Saddles

- A. Clean mainline pipe prior to fusing service saddle.
- B. Install per manufacturer's instructions.
- C. Pressure test saddle against mainline pipe and disinfect service line before cutting in service connection.

3.06 Disinfection of Domestic Water Piping System

- A. Flush and disinfect system in accordance with Sections 33 07 00 and 33 13 00.

3.07 Field Quality Control

- A. Water Service Pressure test system in accordance with AWWA C901 and the following:
 - 1. Test Pressure: Not less than 120 psi unless otherwise approved by the Engineer.
 - 2. Test Procedure shall be in accordance with Section 33 07 00 Part 3.08 Section E.
 - 3. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- B. Glycol Service Pressure test system in accordance with the following:
 - 1. Test Pressure: Not less than 120 psi unless otherwise approved by the Engineer.
 - 2. Test Procedure shall be in accordance with Section 33 07 00 Part 3.08 Section F.
 - 3. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- C. Sewer Service Pressure test system in accordance with the following:
 - 1. Force main Test Pressure: Not less than 45psi unless otherwise approved by the Engineer.
 - a. Test Procedure shall be in accordance with Section 33 07 00 Part 3.08 Section G.
 - b. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
 - 2. Gravity Sewer Pressure: All sanitary gravity sewer pipe installed shall be subject to a water exfiltration test.
 - a. The Contractor shall clean and flush all sanitary sewer pipe prior to testing and final inspection.
 - b. All wyes, tees, or ends of side sewer stubs and service connections shall be plugged or capped and the plug or cap shall be securely fastened to withstand the internal test pressures. Such plugs or caps shall be readily removable and

their removal shall provide a socket suitable for extending the lateral connection.

- c. All testing shall be considered a subsidiary obligation under Furnish and Install Pipe and extra payment will not be allowed for this portion of Work.
 - d. The lengths of service connections shall be included in the computations to determine the allowable leakage for the test section.
3. Exfiltration Test (Using Water)
- a. On completion of a section of sanitary sewer between grinder pump assembly and the house connection, the Owner's Representative shall require that the ends of all pipe be plugged, and the pipe subjected to a hydrostatic pressure. Generally, all testing is to be conducted after backfilling if applicable, and prior to resurfacing.
 - b. A minimum head of six (6) feet of water above the crown at the upper end of the test section shall be maintained for a period of four (4) hours during which time it will be presumed that full absorption of the pipe body has taken place and thereafter for a further period of one (1) hour for the actual test of leakage. During this one-hour period the measured loss shall not exceed the rate of 50 gallons per inch diameter per mile per 24 hours.
 - c. The above listed leakage rate shall also be applied to infiltration from ground water, and infiltration or exfiltration in greater amounts will be cause for rejection of the sanitary sewer. All repairs necessary to meet these requirements and retesting shall be at the expense of the Contractor.
 - d. If it is not apparent that leakage test results between connection points is probably satisfactory, then the Owner's Representative may require subsequent tests to establish the more exact location of the leakage areas. Any section of sanitary sewer between the grinder pump assembly and house connection that does not meet the above requirements shall be rejected and the Contractor, at his expense, shall make the necessary repairs to the sanitary sewer to meet the requirements, and shall make subsequent tests after repairs to assure compliance with the Specifications.

END OF WATER AND SEWER SERVICE CONNECTIONS

SECTION 33 13 00 DISINFECTING OF WATER PIPING

PART 1 - GENERAL

1.01 Summary

- A. Section includes disinfection of potable water distribution system, and sampling and reporting results.

1.02 References

- A. American Water Works Association:
 - 1. AWWA B300 - Hypochlorites.
 - 2. AWWA B303 - Sodium Chlorite.
 - 3. AWWA C651 - Disinfecting Water Mains.

1.03 Submittals

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit procedures, proposed chemicals, and treatment levels for review.
- C. Sample Reports: Indicate results comparative to specified requirements. A disinfection plan and discharge of the disinfectant concentrated water must be submitted for review. The Engineer will receive and approve 48 hours before disinfection commences.

1.04 Closeout Submittals

- A. Disinfection Report:
 - 1. Name of the person administering the disinfectant
 - 2. Type and form of disinfectant used.
 - 3. Date and time of disinfectant injection start and time of completion.
 - 4. Sample locations.
 - 5. Name of person collecting samples.
 - 6. Initial and 24-hour disinfectant concentration and residuals in treated water in ppm for each outlet sampled.
 - 7. Date and time of flushing start and completion.
 - 8. Disinfectant residual after flushing in ppm for each outlet sampled.
 - 9. Information of the State Approved Laboratory certified to conduct the test of the samples.
 - 10. Copies of the analytical reports from the laboratory.
- B. Bacteriological Report:

1. Date issued, project name, and testing laboratory name, address, and telephone number.
 2. Time and date of water sample collection.
 3. Name of person collecting samples.
 4. Sample locations.
 5. Initial and 24-hour disinfectant concentration and residuals in ppm for each outlet sampled.
 6. Coliform bacteria test results for each outlet sampled.
 7. Certify water conforms, or fails to conform, to bacterial standards for potable water.
- C. Water Quality Certificate: Certify water conforms to quality standards of State of Alaska, suitable for human consumption.
- 1.05 Quality Assurance
- A. Perform Work in accordance with AWWA C651.
- 1.06 Qualifications
- A. Sampling Firm: Company certified by State of Alaska in testing potable water systems.
- B. Submit bacteriologist's signature and authority associated with testing of the samples.

PART 2 - PRODUCTS

- 2.01 Disinfection Chemicals
- A. Chemicals: AWWA B300, Hypochlorite, AWWA B301, and AWWAB303, Sodium Chlorite.

PART 3 - EXECUTION

- 3.01 Examination
- A. Verification of existing conditions before starting work.
- B. Verify piping system has been cleaned, inspected, and pressure tested.
- C. Perform scheduling and disinfecting activity with start-up, water pressure testing, adjusting, and balancing, demonstration procedures, including coordination with related systems.
- 3.02 Installation
- A. Provide and attach required equipment to perform the Work of this section.
- B. Perform disinfection of water distribution system and installation of system and pressure testing. Samples will be taken during the disinfection test as indicated by the Sampling Plan and as referenced in AWWA C651.

- C. Inject treatment disinfectant into piping system.
- D. Maintain disinfectant in system for 24 hours. Maximum free residual concentration shall be 20mg/L.
- E. Flush, circulate, and clean until required cleanliness is achieved; use City domestic water.
- F. Replace permanent system devices removed for disinfection.

3.03 Field Quality Control

A. Disinfection, Flushing, and Sampling:

1. Disinfect pipeline installation in accordance with AWWA C651. Use of liquid chlorine is not permitted.
2. Upon completion of retention period required for disinfection, flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally prevailing in existing system or is acceptable for domestic use.
3. Legally dispose of chlorinated water. Dam and contain any accidental discharge of heavily chlorinated liquids. Prior to discharge of chlorinated water to surface water, wetlands or sewers, apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water.
4. After final flushing and before pipeline is connected to existing system, or placed in service, employ an approved independent testing laboratory to test and certify water quality suitable for human consumption.
5. Do not place water piping in service until water testing certifies that water quality is suitable for human consumption.
6. If testing indicates water is not suitable, Contractor shall re-disinfect the system and retest until suitable results are obtained at the Contractor expense.

END OF DISINFECTING OF WATER PIPING

SIGNATURE AND VERIFICATION OF ANTI-COLLUSION

By signing below, I hereby acknowledge the following:

1. Bidder, nor any of their representatives or third party mandated by Bidder, has attempted to contact City representatives or members of the selection committee for the purpose of influencing their choice, judgment or recommendation relating to the contract, or with members of the City Council to influence their decision.
2. Bidder has produced the bid package without collusion, communication, agreement or arrangement with a competitor with regards to price, methods, factors or formulas for setting prices, to the decision to submit a bid package or to present a bid package that does not comply, directly or indirectly, with specifications contained in the Request for Bids.
3. Neither the Bidder nor any of its representatives engaged in discrimination, intimidating measures, influence peddling or corruption or entered into any form of collusion, communication, agreement or arrangement with other suppliers or third parties relating to a contract with the City of Bethel.
4. If selected, neither Bidder nor any of its representatives will engage in discriminating against any person because of race, color, religion (creed), gender, gender expression or identity, age, national origin (ancestry), disability, marital status, sexual orientation, military status, political affiliation, or any other status protected by law.
5. Failure to complete and attach this sworn declaration shall result in automatic rejection of the bid.
6. In the event that the Bidder, or a representative or third party mandated by them, has violated any of the statements above, the Bidder's proposal shall be automatically rejected.
7. The City may cancel a contract that has been awarded if the City becomes aware, during the course of the contract, of a situation contravening any sworn statement required by this section.

Signature Date

Printed Name

ACKNOWLEDGEMENT

STATE OF ALASKA

Before me, a Notary Public, personally appeared the above named and swore that the statements contained in the foregoing document are true and correct.

Subscribed and sworn to me this _____ day of _____, 20____.

Notary Public Signature: _____
Commission Expires: _____

Anti-Collusion



THE STATE
of **ALASKA**
GOVERNOR BILL WALKER

**Department of Environmental
Conservation**

DIVISION OF SPILL PREVENTION AND RESPONSE
Contaminated Sites Program

555 Cordova St
Anchorage, AK 99501
Main: 907-269-7691
Fax: 907-269-7687
www.dec.alaska.gov

File No: 2407.26.004

December 16, 2014

Zef Lakhani
Public Works Director
City of Bethel
P.O. Box 388
Bethel, AK 99559

Re: Decision Document: Bethel Public Works Yard
Corrective Action Complete Determination – Institutional Controls

Dear Mr. Lakhani:

The Alaska Department of Environmental Conservation (ADEC) has reviewed the environmental records for the Bethel Public Works Yard site. This decision letter memorializes the site history, cleanup actions, and specific conditions required to effectively manage remaining contamination. No further remedial action will be required as long as compliance with these conditions is maintained.

Site Name and Location:

Bethel Public Works Yard
1155 Ridgecrest Drive
Bethel, AK 99559

Name and Mailing Address of Contact Party:

Zef Lakhani, Public Works Director
City of Bethel
P.O. Box 388
Bethel, AK 99559

DEC Site Identifiers:

File No: 2407.26.004
Hazard ID: 22955

Regulatory Authority for Determination:

18 AAC 75 and 18 AAC 78

Site Description and Background

The Bethel Public Works Yard site is located roughly 650 feet north-northeast of the Ptarmigan Street and Ridgecrest Drive intersection, in Bethel, Alaska. The public works yard is surrounded by a fence and access is limited. The property grounds are primarily used for staging and fueling vehicles. Frozen ground (permafrost) is present at this site between 8 and 16 feet below ground surface (bgs) and is about 400 feet thick. The nearest drinking water well is located over .25 mile southwest of the site, and is approximately 460 feet deep, with the intake located beneath the permafrost layer. Two

25,000-gallon diesel underground storage tanks (USTs) and two 1,500-gallon gasoline USTs were formerly present at this site. Limited soil sampling in 1993 revealed that a release had occurred in the vicinity of the USTs.

Contaminants of Concern

The following petroleum contaminants of concern, those above ADEC cleanup levels, were identified during the course of the site investigations summarized in the Characterization and Cleanup Activities section of this decision letter.

- Gasoline Range Organics (GRO)
- Diesel Range Organics (DRO)
- Benzene
- Toluene
- Ethylbenzene
- Xylenes

Cleanup Levels

GRO, DRO, and benzene, toluene, ethylbenzene, and xylenes (BTEX) were present in soil above the Method 2 migration to groundwater (MTG) cleanup levels for the under 40-inch precipitation zone, established in 18 AAC 75.341(c), Table B1, and 18 AAC 75.341 (d), Table B2.

Table 1 – ADEC Cleanup Levels

Contaminant	Soil – MTG (mg/kg)	Soil – Direct Contact (mg/kg)	Soil – Inhalation (mg/kg)	Maximum Remaining Concentration (mg/kg)
GRO	300	1,400	1,400	2,000
DRO	250	10,250	12,500	7,900
Benzene	0.025	150	11	8.1
Toluene	6.5	8,100	220	24
Ethylbenzene	6.9	10,100	110	27
Xylenes	63	20,300	63	180

mg/kg = milligrams per kilogram

MTG = migration to groundwater

Characterization and Cleanup Activities

In June of 1996, 13 test pits (TP1 through TP13) were advanced around the USTs and their associated piping in an effort to delineate the extent of impacted soil. Results of the investigation revealed the contamination was prominent in the surface and subsurface soils surrounding the USTs and beneath the dispensing equipment. Permafrost was encountered at 8 feet bgs during this investigation.

The USTs and their associated piping and dispensing equipment were removed in November 1997. Soils removed during excavation were field screened using a photoionization detector (PID) to evaluate for the presence of volatile organic compounds (VOCs) and were temporarily stockpiled based on field screening results. The excavation continued until frozen ground was encountered,

which was between 10 and 16 feet bgs. Confirmation soil samples were collected from the base and sidewalls of the excavation and were analyzed by an ADEC approved laboratory for GRO, DRO, and BTEX and VOCs. Analytical results revealed that GRO, DRO, and BTEX remain in the western portion of the excavation, beneath the former dispensers, above their respective ADEC cleanup criteria (Please see the enclosed site map).

Following the excavation and sampling activities, approximately 1,300 cubic yards of contaminated soil was permanently stockpiled at the Bethel Fire Training Center, located roughly 700 feet northeast of the site. It was later reported that the stockpile was sampled and transferred to the Bethel Landfill along with several other piles of contaminated soil.

Concentrations of GRO, DRO, and BTEX remain at the base of the excavation above ADEC cleanup levels. However, the excavation was commenced vertically until frozen ground (permafrost) was encountered and further excavation vertically is not feasible. Groundwater was not encountered in the deepest portion of the excavation. The nearest drinking water well is located over .25 mile southwest of the site, and is approximately 460 feet deep. In addition, three above ground storage tanks (ASTs) were constructed to replace the former USTs, and are located over the former dispenser excavation. It would be difficult and may pose a safety risk to continue excavation at this site. At this time, the remaining contamination does not pose a risk to human health or the environment.

Cumulative Risk Evaluation

Pursuant to 18 AAC 78.600(d), when detectable contamination remains on-site following a cleanup, a cumulative risk determination must be made that the risk from hazardous substances does not exceed a cumulative carcinogenic risk standard of 1 in 100,000 across all exposure pathways and does not exceed a cumulative non-carcinogenic risk standard at a hazard index of one across all exposure pathways.

Based on a review of the environmental record, ADEC has determined that residual contaminant concentrations do not pose a cumulative human health risk.

Exposure Pathway Evaluation

Following investigation and cleanup at the site, exposure to the remaining contaminants was evaluated using ADEC's Exposure Tracking Model (ETM). Exposure pathways are the conduits by which contamination may reach human or ecological receptors. ETM results show all pathways to be one of the following: De-Minimis Exposure, Exposure Controlled, or Pathway Incomplete. A summary of this pathway evaluation is included in Table 2.

Table 2 – Exposure Pathway Evaluation

Pathway	Result	Explanation
Surface Soil Contact	Pathway Incomplete	Contamination is not present in surface soil (0 to 2 feet below ground surface).
Sub-Surface Soil Contact	De-Minimis Exposure	GRO contamination remains in the sub-surface soils above direct contact cleanup levels; however, further excavation is impractical and the extent of contamination is limited.

Inhalation – Outdoor Air	De-Minimis Exposure	GRO and xylene contamination remains in the sub-surface soils above inhalation cleanup levels; however, further excavation is impractical and the extent of contamination is limited.
Inhalation – Indoor Air (vapor intrusion - VI)	De-Minimis Exposure	Volatile contamination remains in the sub-surface soils; however, no buildings are present within 30 feet of the remaining contamination. Additionally, the contamination remains at a depth of 10 feet or greater. Since VI is unlikely for petroleum COCs at this depth, risk via this pathway is considered insignificant.
Groundwater Ingestion	Pathway Incomplete	Groundwater contamination is not present.
Surface Water Ingestion	Pathway Incomplete	Surface water is not contaminated and is not used as a drinking water source in the vicinity of the site.
Wild and Farmed Foods Ingestion	Pathway Incomplete	Site is not located in an area used for foraging activities.
Exposure to Ecological Receptors	Pathway Incomplete	Terrestrial and aquatic routes are not present.

Notes to Table 2: “De-Minimis Exposure” means that in ADEC’s judgment receptors are unlikely to be affected by the minimal volume or concentration of remaining contamination. “Pathway Incomplete” means that in ADEC’s judgment contamination has no potential to contact receptors. “Exposure Controlled” means there is an administrative mechanism in place limiting land or groundwater use, or a physical barrier in place that deters contact with residual contamination.

ADEC Decision

Petroleum contamination remains on-site in soil and groundwater above ADEC cleanup levels; however, ADEC has determined there is no unacceptable risk to human health or the environment as long as the contamination is properly managed in accordance with the following conditions.

1. Any future change in land use may impact the exposure assumptions cited in this document. If land use and/or ownership changes, these management conditions may not be protective and ADEC may require additional remediation and revised conditions. Therefore the City of Bethel shall report to ADEC every 5 years to document land use, or report as soon as the City of Bethel becomes aware of any change in land ownership and/or use, if earlier. The report can be sent to the local ADEC office or electronically to DEC.ICUnit@alaska.gov.
2. Installation of groundwater wells requires ADEC approval.
3. Sub-surface soil contamination remains beneath the current AST fueling station. If the soil becomes accessible and/or is encountered in the future, the soil must be evaluated and contamination addressed in accordance with an ADEC approved work plan.
4. Any proposal to transport soil or groundwater off-site requires ADEC approval in accordance with 18 AAC 78.600(h). A “site” [as defined by 18 AAC 75.990 (115)] means an area that is contaminated, including areas contaminated by the migration of hazardous substances from a source area, regardless of property ownership.

5. Movement or use of contaminated material in a manner that results in a violation of 18 AAC 70 water quality standards is prohibited.

The ADEC Contaminated Sites Database will be updated to reflect the change in site status as detailed above, and will include a description of the contamination remaining at the site. Institutional controls will be removed in the future if documentation can be provided that shows cleanup levels have been met. Management conditions 4 and 5 remain in effect after ICs are removed.

This determination is in accordance with 18 AAC 78.276(f) and does not preclude ADEC from requiring additional assessment and/or cleanup action if future information indicates that this site may pose an unacceptable risk to human health or the environment.

Appeal

Any person who disagrees with this decision may request an adjudicatory hearing in accordance with 18 AAC 15.195 – 18 AAC 15.340 or an informal review by the Division Director in accordance with 18 AAC 15.185. Informal review requests must be delivered to the Division Director, 410 Willoughby Avenue, Suite 303, Juneau, Alaska 99811-1800, within 15 days after receiving the department's decision reviewable under this section. Adjudicatory hearing requests must be delivered to the Commissioner of the Department of Environmental Conservation, 410 Willoughby Avenue, Suite 303, Juneau, Alaska 99811-1800, within 30 days after the date of issuance of this letter, or within 30 days after the department issues a final decision under 18 AAC 15.185. If a hearing is not requested within 30 days, the right to appeal is waived.

Please sign and return *Attachment A* to ADEC within 30 days of receipt of this letter. If you have questions about this closure decision, please feel free to contact me at (907) 269-7691.

Sincerely,



Joshua Barsis
Environmental Program Specialist

Enclosures: Site Map

cc: RFA via email at dec.spar.cr@alaska.gov
Kamie Willis, DOL (via email)

Attachment A: Cleanup Complete-ICs Agreement and Signature Page*

The City of Bethel agrees to the terms and conditions of this Corrective Action Complete Determination, as stated in this decision letter for the Bethel Public Works Yard site, dated **December 16, 2014**. Failure to comply with the terms and conditions of the determination may result in ADEC reopening this site and requiring further remedial action in accordance with 18 AAC 18 AAC 78.276(f).

Signature of Authorized Representative, Title

Date

Printed Name of Authorized Representative, Title

Note to Responsible Person (RP):

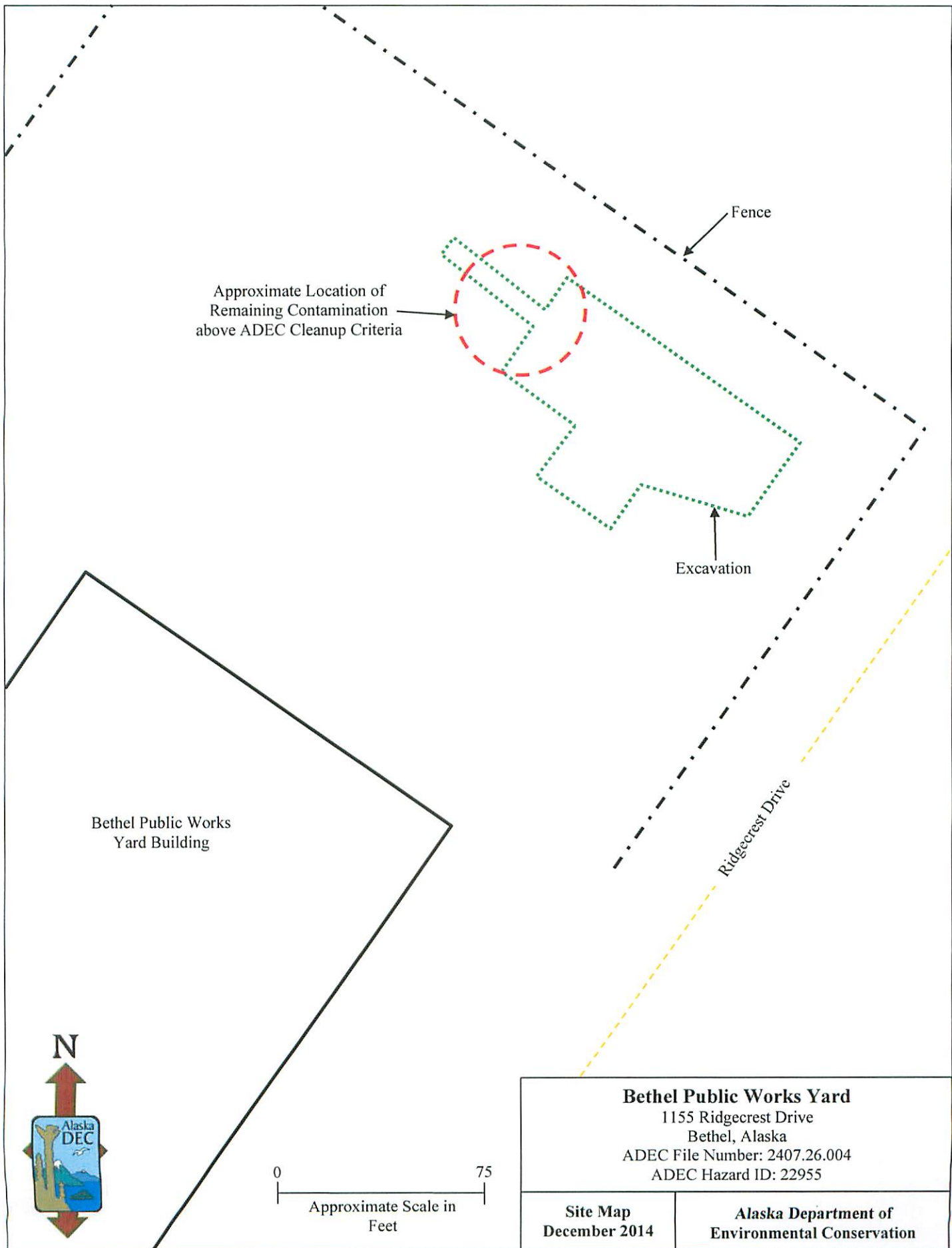
After making a copy for your records, please return a signed copy of this form to the ADEC project manager at the address on this correspondence within 30 days of receipt of this letter.

ADEC File No. 2407.26.004
Hazard ID: 22955
ADEC Project Manager: Joshua Barsis

For Internal Use Only

***Attention ADEC Administration Staff:** Please follow the procedure below after Attachment A is signed/returned to ADEC.

1. Log-in and Date Stamp *Attachment A*
2. Scan and Save to the appropriate electronic folder on the network Drive
3. File the hard copy in the appropriate project/site file Correspondence Folder (blue in Anchorage).
4. Provide the Correspondence folder (with the filed *Attachment A* hard copy) to the ADEC Project Manager



NOTICE OF AWARD

Date of Issuance:

Owner:

Owner's Project No.:

Engineer:

Engineer's Project No.:

Project:

Contract Name:

Bidder:

Bidder's Address:

You are notified that Owner has accepted your Bid dated **[date]** for the above Contract, and that you are the Successful Bidder and are awarded a Contract for:

[Describe Work, alternates, or sections of Work awarded]

The Contract Price of the awarded Contract is \$**[Contract Price]**. Contract Price is subject to adjustment based on the provisions of the Contract, including but not limited to those governing changes, Unit Price Work, and Work performed on a cost-plus-fee basis, as applicable.

[Number of copies sent] unexecuted counterparts of the Agreement accompany this Notice of Award, and one copy of the Contract Documents accompanies this Notice of Award, or has been transmitted or made available to Bidder electronically.

☐ Drawings will be delivered separately from the other Contract Documents.

You must comply with the following conditions precedent within 15 days of the date of receipt of this Notice of Award:

1. Deliver to Owner **[number of copies sent]** counterparts of the Agreement, signed by Bidder (as Contractor).
2. Deliver with the signed Agreement(s) the Contract security (such as required performance and payment bonds) and insurance documentation, as specified in the Instructions to Bidders and in the General Conditions, Articles 2 and 6.
3. Other conditions precedent (if any): **[Describe other conditions that require Successful Bidder's compliance]**

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within 10 days after you comply with the above conditions, Owner will return to you one fully signed counterpart of the Agreement, together with any additional copies of the Contract Documents as indicated in Paragraph 2.02 of the General Conditions.

Owner: **[Full formal name of Owner]**

By (signature): _____

Name (printed): _____

Title: _____

Copy: Engineer

EJCDC® C-510, Notice of Award.

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Page 1 of 1

NOTICE TO PROCEED

Owner: _____ Owner's Project No.: _____
Engineer: _____ Engineer's Project No.: _____
Contractor: _____ Contractor's Project No.: _____
Project: _____
Contract Name: _____
Effective Date of Contract: _____

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on **[date Contract Times are to start]** pursuant to Paragraph 4.01 of the General Conditions.

On that date, Contractor shall start performing its obligations under the Contract Documents. No Work will be done at the Site prior to such date.

In accordance with the Agreement: **[Select one of the following two alternatives, insert dates or number of days, and delete the other alternative.]**

The date by which Substantial Completion must be achieved is **[date for Substantial Completion, from Agreement]**, and the date by which readiness for final payment must be achieved is **[date for readiness, from Agreement]**.

[or]

The number of days to achieve Substantial Completion is **[number of days, from Agreement]** from the date stated above for the commencement of the Contract Times, resulting in a date for Substantial Completion of **[date, calculated from commencement date above]**; and the number of days to achieve readiness for final payment is **[number of days, from Agreement]** from the commencement date of the Contract Times, resulting in a date for readiness for final payment of **[date, calculated from commencement date above]**.

Before starting any Work at the Site, Contractor must comply with the following:

[Note any access limitations, security procedures, or other restrictions]

Owner: **[Full formal name of Owner]**
By *(signature)*: _____
Name *(printed)*: _____
Title: _____
Date Issued: _____
Copy: Engineer

Contractor's Application for Payment

Owner: _____ Engineer: _____ Contractor: _____ Project: _____ Contract: _____	Owner's Project No.: _____ Engineer's Project No.: _____ Contractor's Project No.: _____
Application No.: _____ Application Date: _____	
Application Period: From _____ to _____	

1. Original Contract Price	\$	-
2. Net change by Change Orders	\$	-
3. Current Contract Price (Line 1 + Line 2)	\$	-
4. Total Work completed and materials stored to date (Sum of Column G Lump Sum Total and Column J Unit Price Total)	\$	-
5. Retainage		
a. _____ X \$ _____ Work Completed	\$	-
b. _____ X \$ _____ Stored Materials	\$	-
c. Total Retainage (Line 5.a + Line 5.b)	\$	-
6. Amount eligible to date (Line 4 - Line 5.c)	\$	-
7. Less previous payments (Line 6 from prior application)		
8. Amount due this application	\$	-
9. Balance to finish, including retainage (Line 3 - Line 4)	\$	-

Contractor's Certification

The undersigned Contractor certifies, to the best of its knowledge, the following:

(1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment;

(2) Title to all Work, materials and equipment incorporated in said Work, or otherwise listed in or covered by this Application for Payment, will pass to Owner at time of payment free and clear of all liens, security interests, and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such liens, security interest, or encumbrances); and

(3) All the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

Contractor: _____	
Signature: _____	Date: _____

Recommended by Engineer By: _____ Title: _____ Date: _____	Approved by Owner By: _____ Title: _____ Date: _____
Approved by Funding Agency By: _____ Title: _____ Date: _____	By: _____ Title: _____ Date: _____

Contractor's Application for Payment

Owner:	_____	Owner's Project No.:	_____
Engineer:	_____	Engineer's Project No.:	_____
Contractor:	_____	Contractor's Project No.:	_____
Project:	_____		
Contract:	_____		

Application No.:		Application Period:		From		to		Application Date:				
A	B	C	D	E	F	G	H	I	J	K	L	
Bid Item No.	Description	Contract Information				Work Completed		Materials Currently Stored (not in G) (\$)	Work Completed and Materials Stored to Date (H + I) (\$)	% of Value of Item (J / F) (%)	Balance to Finish (F - J) (\$)	
		Item Quantity	Units	Unit Price (\$)	Value of Bid Item (C X E) (\$)	Estimated Quantity Incorporated in the Work	Value of Work Completed to Date (E X G) (\$)					
Original Contract												
					-		-		-		-	
					-		-		-		-	
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					-		-		-		-	
Original Contract Totals					\$	-	\$	-	\$	-	\$	-

Contractor's Application for Payment

Owner's Project No.:	
Engineer's Project No.:	
Contractor's Project No.:	

Application Date: _____

A	B	C	D	E	F	G	H	I	J	K	L
Bid Item No.	Description	Contract Information				Work Completed		Materials Currently Stored (not in G) (\$)	Work Completed and Materials Stored to Date (H + I) (\$)	% of Value of Item (J / F) (%)	Balance to Finish (F - J) (\$)
		Item Quantity	Units	Unit Price (\$)	Value of Bid Item (C X E) (\$)	Estimated Quantity Incorporated in the Work	Value of Work Completed to Date (E X G) (\$)				
Change Orders											
					-		-		-		-
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					-		-		-		-
Change Order Totals					\$ -		\$ -	\$ -	\$ -		\$ -
Original Contract and Change Orders											
Project Totals					\$ -		\$ -	\$ -	\$ -		\$ -

Contractor's Application for Payment

Owner:		Owner's Project No.:	
Engineer:		Engineer's Project No.:	
Contractor:		Contractor's Project No.:	
Project:			
Contract:			

Application No.: _____ Application Period: From _____ to _____ Application Date: _____

[illegible]

CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner:
Engineer:
Contractor:
Project:
Contract Name:

Owner's Project No.:
Engineer's Project No.:
Contractor's Project No.:

This ☐ Preliminary ☐ Final Certificate of Substantial Completion applies to:

☐ All Work ☐ The following specified portions of the Work:

[Describe the portion of the work for which Certificate of Substantial Completion is issued]

Date of Substantial Completion: **[Enter date, as determined by Engineer]**

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor; see Paragraph 15.03.D of the General Conditions.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work must be as provided in the Contract, except as amended as follows:

Amendments to Owner's Responsibilities: ☐ None ☐ As follows:

[List amendments to Owner's Responsibilities]

Amendments to Contractor's Responsibilities: ☐ None ☐ As follows:

[List amendments to Contractor's Responsibilities]

The following documents are attached to and made a part of this Certificate:

[List attachments such as punch list; other documents]

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents, nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

Engineer

By *(signature)*: _____

Name *(printed)*: _____

Title: _____

Change Order No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

The Contract Documents are modified as follows upon execution of this Change Order:

Description:

Attachments (list documents supporting change):

CHANGE IN CONTRACT PRICE:

Original Contract Price:

\$ _____

[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____

\$ _____

Contract Price prior to this Change Order:

\$ _____

[Increase] [Decrease] of this Change Order:

\$ _____

Contract Price incorporating this Change

\$ _____

CHANGE IN CONTRACT TIMES:

Original Contract Times: ☐ Working days ☐ Calendar days

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____:

Substantial completion (days): _____

Ready for final payment (days): _____

Contract Times prior to this Change Order:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

[Increase] [Decrease] of this Change Order:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

Contract Times incorporating approved Change Orders:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

RECOMMENDED:

By: _____
Engineer (Authorized Signature)

Date: _____

Approved by Funding Agency (if applicable):

ACCEPTED:

By: _____
Owner (Authorized Signature)

Date: _____

ACCEPTED:

By: _____
Contractor (Authorized Signature)

Date: _____

Date: _____