

City of Rockland Transfer Station Upgrade

Bidding Documents For Construction



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Portland, ME 04102
800.426.4262

woodardcurran.com
COMMITMENT & INTEGRITY DRIVE RESULTS

**203966.23
City of Rockland**

April 2018

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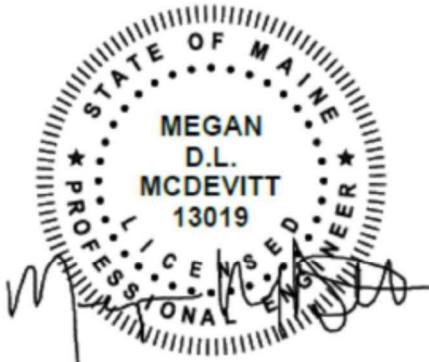
SECTION 00 01 07

SEALS PAGE

The engineering material and data contained in these Contract Documents were prepared under the supervision and direction of the undersigned, whose seal as registered professional engineer is affixed below.

April 13, 2018

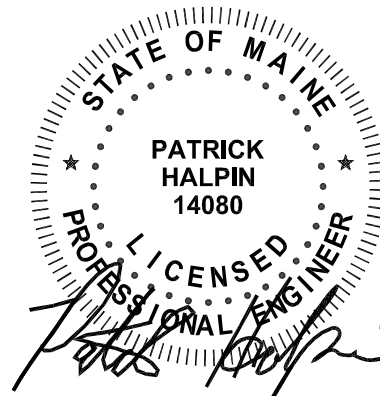
Date of Issue



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SECTION 00 01 10

TABLE OF CONTENTS – BIDDING DOCUMENTS

DIVISION 00 PROCUREMENT AND CONTRACTING REQUIREMENTS

INTRODUCTORY INFORMATION

00 01 07	Seals Page
00 01 10	Table of Contents
00 01 15	List of Drawing Sheets

PROCUREMENT/BIDDING REQUIREMENTS

00 11 16	Invitation to Bid
00 21 13	Instructions to Bidders
00 41 01	Bid Form
	Bid Bond – Penal Sum Form (C-00 43 13)
00 43 36	Proposed Subcontractors Form
00 43 93	Bid Submittal Checklist
00 45 05	Bidder's Representations and Certifications
00 45 13	Bidder's Qualifications
00 45 19	Non-Collusion Affidavit

CONTRACTING REQUIREMENTS

	Sample Notice of Award (C-00 51 00)
00 52 10	Agreement Form
00 54 00	<u>Agreement Form Supplements (listing)</u>
	<i>Performance Bond Form (C-00 61 13.13)</i>
	<i>Payment Bond Form (C-00 61 13.16)</i>
	Sample Notice to Proceed (C-00 55 00)
00 60 00	<u>Project Forms (listing)</u>
	<i>Application for Payment Form (C-00 62 76)</i>
	<i>Request for Interpretation/Information Form (C-00 63 15)</i>
	<i>Field Order Form (C-00 63 36)</i>
	<i>Work Change Directive Form (C-00 63 49)</i>
	<i>Change Request Form (C- 00 63 60)</i>
	<i>Change Order Form (C-00 63 63)</i>
	<i>Notice of Substantial Completion Form (C-00 65 15)</i>
	<i>Certificate of Substantial Completion Form (C-00 65 16)</i>
	<i>Notice of Completion Form (C-00 65 18)</i>
00 72 05	Standard General Conditions of the Construction Contract (EJCDC C-700, 2007)
	<i>Including modifications</i>
00 73 05	<u>Supplementary Conditions (listing)</u>
	00 73 10 Project Specific Requirements
	00 73 19 Health and Safety Requirements
	00 73 43 Wage Rate Requirements
	00 73 46 Wage Determination Schedule

SPECIFICATIONS

DIVISION 01 GENERAL REQUIREMENTS

- 01 11 00 Summary of Work
- 01 15 00 Specific Project Requirements and Procedures
- 01 15 30 Payment and Administrative Procedures and Quality Requirements
- 01 50 00 Temporary Facilities and Controls
- 01 60 00 Product Requirements
- 01 70 00 Execution and Closeout Requirements

DIVISION 03 - CONCRETE

- 03 11 00 Concrete Forming
- 03 16 00 Concrete Specialties
- 03 20 00 Concrete Reinforcing
- 03 30 00 Cast-in-Place Concrete
- 03 30 20 Concrete Placing, Curing and Finishing

DIVISION 05 - METALS

- 05 50 00 Metal Fabrications

DIVISION 09 - FINISHES

- 09 90 00 Painting and Coating

DIVISION 26 - ELECTRICAL

- 26 05 00 Common Work Results for Electrical
- 26 05 19 Low-Voltage Electrical Power Conductor and Cables
- 26 05 26 Grounding and Bonding for Electrical Systems
- 26 05 33 Raceways and Boxes for Electrical Systems
- 26 28 16 Enclosed Switches and Circuit Breakers

END OF SECTION

SECTION 00 01 15

LIST OF DRAWING SHEETS

DRAWING NUMBER	DRAWING TITLE
G-000	Cover
S-001	Structural Notes
D-001	Structural Demolition Plans & Elevation
D-002	Demolition Photos
S-101	Operating Floor Plans
S-102	Ground Floor Plan
S-103	Structural Details – 1
S-104	Structural Details – 2
E-001	Electrical Legend and Abbreviations
E-101	Electrical Demolition Plans
E-102	Electrical Plans and Schedules

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SECTION 00 11 16

INVITATION TO BID

City of Rockland (Owner) invites Bidders to submit sealed Bids for the Transfer Station Upgrade, which includes, but is not limited to construction of upgrades to the existing transfer station building; and all materials and equipment, services and construction inherent to the Work.

The Work shall begin on or after July 2, 2018, shall be substantially complete by September 14, 2018 and completed and ready for final payment by September 28, 2018.

A mandatory pre-Bid conference will be held at **1:00 PM** local time on **Monday, April 23, 2018** in the Council Chambers at Rockland City Hall, 270 Pleasant Street, Rockland Maine 04841. Bidders are required to attend and participate in the conference.

Sealed Bids will be received until **2:30 PM** local time on **Thursday, May 17, 2018** at Owner's offices at Rockland City Hall, 270 Pleasant Street, Rockland, ME 04841, Attention: City Manager. Bids shall be submitted in a plain envelope with the upper left hand corner marked with the company name and "Transfer Station Upgrade Bid". Bids will then and there be publicly opened and read aloud. Bids received after the time of announced opening will not be accepted.

Bidding Documents may be obtained on or after **April 13, 2018**, at **8:00 AM electronically** at no cost by registering via email with the Engineer at **splante@woodardcurran.com** with the subject line "City of Rockland Transfer Station Upgrade" to be included on the Bidder's list. Instructions for accessing the Bidding Documents will then be provided by email.

Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of the incomplete sets of Bidding Documents or for modifications to the Bidding Documents including electronic conversion.

Bid security in the amount of 5 percent of the Bid must accompany the Bid in accordance with the Instructions to Bidders.

Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to not be eligible or responsible. Owner may also reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project or the public to make an award to that Bidder. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.

END OF SECTION

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SECTION 00 21 13

INSTRUCTIONS TO BIDDERS

ARTICLE 1 – DEFINED TERMS

- 1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions, if any. Additional terms used in these Instructions to Bidders have the meanings indicated below and as may be included in the Supplementary Instructions to Bidders.
- A. *Issuing Office* – The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered identified in the Invitation to Bid.
 - B. *Supplements* – Those portions of the Bidding Requirements to be submitted with and made a condition of a Bid including required submittals.
 - C. *Notice of Intent to Award* – The written notice to the Successful Bidder indicating, conditions precedent to receiving a Notice of Award and Agreement for execution.

ARTICLE 2 – COPIES OF BIDDING DOCUMENTS

- 2.01 Sets of Bidding Documents may be examined and obtained as stated in the Invitation to Bid.
- 2.02 Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents, Bidding Documents provided by third parties, or for modifications to the Bidding Documents not made by official Addenda, including electronic conversion.
- 2.03 Owner and Engineer, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Work and do not authorize or confer a license for any other use.

ARTICLE 3 – QUALIFICATIONS OF BIDDERS

- 3.01 To demonstrate Bidder's qualifications to perform the Work, Bidder shall submit written evidence such as financial data, previous experience, present commitments, and such other data requested in the Bidding Documents, and within the time frames stipulated upon Owner's request.
- 3.02 Bidders shall meet minimum criteria regarding experience and qualifications set forth in the General Requirements and the Specifications.

ARTICLE 4 – EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE

4.01 *Subsurface and Physical Conditions*

- A. Section 00 73 10 of the Supplementary Conditions identifies:
 - 1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and
 - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).
- B. Copies of reports and drawings referenced in Section 00 73 10, if any, are included in the Bidding Documents as indicated in Section 00 31 00, if included. Those reports and drawings are not part of the Contract Documents, but the “technical data” contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.02 of the General Conditions, has been identified and established in Section 00 73 10 of the Supplementary Conditions.
- C. 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.

4.02 *Underground Facilities*

- A. Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.

4.03 *Hazardous Environmental Condition*

- A. Section 00 73 10 of the Supplementary Conditions identifies any reports and drawings known to Owner relating to a Hazardous Environmental Condition identified at the Site.

Copies of reports and drawings referenced in Section 00 73 10, if any, are included in the Bidding Documents as indicated in Section 00 31 00 if included. Those reports and drawings are not part of the Contract Documents, but the “technical data” contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.06 of the General Conditions has been identified and established in Section 00 73 10 of the Supplementary Conditions.

- C. 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.
- 4.04 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 4.02, 4.03, and 4.04 of the General Conditions and Section 00 73 10 of the Supplementary 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 4.06 of the General Conditions and Section 00 73 10 of the Supplementary Conditions.
- 4.05 Upon request, Owner may provide Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid. Bidder shall be responsible for obtaining permission and necessary permits and insurance for access to the Site. Bidder shall clean up and restore the Site to its former condition upon completion of any such explorations, investigations, tests, and studies. Bidder shall comply with all applicable Laws and Regulations relative to excavation and utility locates.
- 4.06 Reference is made to Article 7 of the General Conditions and Section 00 73 10 of the Supplementary Conditions for the identification of the general nature of other work that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) that relates to the Work contemplated by these Bidding Documents. On request, Owner will provide to each Bidder for examination access to or copies of contract documents (other than portions thereof related to price) for such other work.

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

- A. examine and carefully study the Bidding Documents, and the other related data identified in the Bidding Documents;
- B. visit the Site and become familiar with and satisfy Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
- C. become familiar with and satisfy Bidder as to all federal, state, and local 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 contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in Section 00 73 10, as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Section 00 73 10, as containing reliable "technical data";
- E. consider the information known to Bidder; 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, including applying any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs;
- F. agree at the time of submitting its Bid that 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(s) 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. correlate the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents;

- I. 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; and
 - J. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.
- 4.08 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by Engineer are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

ARTICLE 5 – PRE-BID CONFERENCE

- 5.01 A pre-Bid conference will be held at the time, date and location as indicated in the Invitation to Bid. Bidders are required to attend and participate in the conference.
- 5.02 Addenda will be issued to all prospective Bidders of record considered necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

ARTICLE 6 – SITE AND OTHER AREAS

- 6.01 The Site is identified in the Bidding Documents. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by Owner unless otherwise provided in the Bidding Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by Contractor.

ARTICLE 7 – INTERPRETATIONS AND ADDENDA

- 7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to the Engineer in writing as follows. Submission of questions via email is acceptable.

Woodard & Curran
41 Hutchins Drive
Portland, ME 04102
Attention: Megan McDevitt
Telephone: (207) 558-3785
Email: mmcdevitt@woodardcurran.com

- 7.02 Interpretations or clarifications considered necessary in response to such questions will be issued by Addenda to all parties recorded as having received the Bidding Documents. Questions received less than Questions received on or after May 10, 2018 will not be answered. Only answers in the Addenda will be binding. Oral statements, interpretations, and clarifications may not be relied upon and will not be binding or legally effective.
- 7.03 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by Owner or Engineer, will be available for examination at the Issuing Office and will be sent electronically by email to all parties recorded as having received the Bidding Documents and will be posted on the website established as indicated in the Invitation to Bid.
- 7.04 All parties recorded as having received the Bidding Documents will be notified by email on record that Addenda has been posted on the website along with instructions for accessing the Addenda.

ARTICLE 8 – BID SECURITY

- 8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of 5 percent of Bidder's maximum Bid price and in the form of a certified check, treasurer's or cashier's check, or money order, or a Bid bond on or consistent with the form included in the Bidding Documents in Section 00 43 13 issued by a surety meeting the requirements of Paragraphs 5.01 and 5.02 of the General and Supplementary Conditions, if any.
- 8.02 The Bid security of the Successful Bidder will be retained until such Bidder has furnished the required contract security, met the conditions of the Notice of Intent to Award (if any) and Notice of Award, and executed the Agreement, whereupon the Bid security will be returned. If the Successful Bidder fails to comply with the conditions set forth in the Notice of Intent to Award (if any) and Notice of Award within the time specified therein, 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. The Bid security of other Bidders whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier

of 7 days after the Effective Date of the Agreement or 91 days after the Bid opening, whereupon Bid security furnished by such Bidders will be returned. See Supplementary Instructions to Bidders (if any) for additional information.

- 8.03 Bid security of other Bidders whom Owner believes do not have a reasonable chance of receiving the award will be returned within 5 days after the Bid opening.

ARTICLE 9 – CONTRACT TIMES

- 9.01 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 10 – LIQUIDATED DAMAGES

- 10.01 Provisions for liquidated damages, if any, are set forth in the Agreement.

ARTICLE 11 – SUBSTITUTE AND “OR-EQUAL” ITEMS

- 11.01 The Contract, if awarded, will be on the basis of materials and equipment and construction methods or procedures specified or described in the Bidding Documents without consideration of possible substitute or “or-equal” items. Whenever it is specified or described in the Bidding Documents that a substitute or “or-equal” item of material or equipment and construction methods or procedures may be furnished or used by Contractor if acceptable to Engineer, application for such acceptance will not be considered by Engineer until after the Effective Date of the Agreement.

ARTICLE 12 – SUBCONTRACTORS, SUPPLIERS AND OTHERS

- 12.01 The Bidding Documents may require the identity of certain Subcontractors, Suppliers, individuals, or entities to be submitted to Owner with the Bid.
- 12.02 As required in the Bidding Documents, or within 5 days after Bid opening if requested by Owner, Bidder shall submit a listing and experience statement with pertinent information regarding similar projects and other evidence of qualification for each Subcontractor, Supplier, 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 a substitute without an increase in the Bid.
- 12.03 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest responsible Bidder that proposes to use acceptable Subcontractors, Suppliers, individuals, or entities. Declining to make requested substitutions will not 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 revocation of such acceptance after the Effective Date of the Agreement as provided in Paragraph 6.06 of the General and Supplementary Conditions, if any.

- 12.04 Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom Contractor has reasonable objection.

ARTICLE 13 – PREPARATION OF BID

- 13.01 The Bid Form and Supplements are included with the Bidding Documents.
- 13.02 Bids are to be submitted as indicated in the Bid Form. All blanks on the Bid Form shall be completed in ink or typewritten and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form.
- 13.03 A Bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. The corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown.
- 13.04 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 shown.
- 13.05 A Bid by a limited liability company shall be executed in the name of the firm by a member 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.
- 13.06 A Bid by an individual shall show the Bidder's name and official address.
- 13.07 A Bid by a joint venture shall be executed by each joint venturer in the manner indicated on the Bid Form. The official address of the joint venture shall be shown.
- 13.08 All names shall be printed in ink below the signatures.
- 13.09 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.
- 13.10 Postal and e-mail addresses and telephone numbers for communications regarding the Bid shall be shown.
- 13.11 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. See Supplementary Instructions to Bidders for additional requirements, if any.

- 13.12 Bidders are advised to carefully review those portions of the Bid Form and Supplements requiring Bidder's representations and certifications that are to be submitted with a Bid or subsequent to the Bid opening, and made a condition of the Bid.

ARTICLE 14 – BASIS OF BID; COMPARISON OF BIDS

14.01 *Bid Pricing*

- A. Bidders shall submit a Bid on a lump sum basis as provided for in the Bid Form. Bid price shall be stated in both words and figures.
- B. Discrepancies between prices written in words and prices written in figures will be resolved in favor of prices written in words. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

14.02 *Alternates (if any)*

- A. Bidders shall include a separate price for each alternate described in the Bidding Documents as provided for in the Bid Form or Unit Prices Form, and Supplements if any. The price for each alternate will be considered in accordance with Article 19.

14.03 *Completion Time Comparisons*

- A. Bid prices will be compared after adjusting for exceptions taken by Bidders for the number of days or dates set for Substantial Completion per Article 9 above. The adjusting amount will be determined at the rate set forth in the Agreement for liquidated damages for failing to achieve Substantial Completion.

ARTICLE 15 – SUBMITTAL OF BID

- 15.01 With each copy of the Bidding Documents, a Bidder is furnished a copy of the Bid Form, the Bid Security Form and Supplements. An original signed hard copy of the Bid Form, the original of the Bid security, Supplements (as listed in the Bid Submittal Checklist), and the Bid Submittal Checklist are to be completed and submitted. *Bidders shall also submit a scanned version of the hardcopy, signed original of the above documents saved in Portable Document Format (PDF) format and submit on CD or diskette.
- 15.02 A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the Invitation to Bid and shall be enclosed in a plainly marked package with the Project title, the name and address of Bidder, and shall be accompanied by the Bid security and other required documents.
- 15.03 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.” A Bid sent by mail or courier shall be addressed to Owner at Rockland City Hall, 270 Pleasant Street, Rockland, ME 04841, Attention: City Manager, City of Rockland.

- 15.04 Bidders shall be responsible to confirm the ability of overnight mailing or courier services to deliver to the Owner’s offices.

ARTICLE 16 – MODIFICATION AND WITHDRAWAL OF BID

- 16.01 A Bid may be modified or 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.
- 16.02 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. Thereafter, if the Work is re-Bid, that Bidder will be disqualified from submitting a Bid on the Work.

ARTICLE 17 – OPENING OF BIDS

- 17.01 Bids will be opened at the time and place indicated in the Invitation to Bid and, unless obviously non-responsive, read aloud publicly.

ARTICLE 18 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 18.01 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 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT

- 19.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to not be responsible or eligible or does not meet the specified qualification or quality requirements, based on poor references or otherwise. Owner may also reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project or public to make an award to that Bidder. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate Contract terms with the Successful Bidder.
- 19.02 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.

- 19.03 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.
- 19.04 In evaluating Bidders, Owner will consider the qualifications of Bidders and may consider the qualifications and experience of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities are submitted.
- A. Owner may also consider the operating costs, maintenance requirements, performance data and guarantees of major items of materials and equipment proposed for incorporation in the Work when such data is required to be submitted prior to the Notice of Award.
- 19.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work in accordance with the Contract Documents.
- A. Owner may conduct reference checks for the projects listed by the Bidder. Poor references may be a basis for deeming Bidder as not responsible. Reference questions will include, but are not limited to, product quality and durability, overall work quality, performance, timely delivery/completion, customer service, and general customer satisfaction.
- 19.06 If the Contract is to be awarded, Owner may award the Contract to the responsive, responsible, and eligible Bidder, offering the lowest price for the Bid and whose Bid is in the best interests of the Project or public.

ARTICLE 20 – CONTRACT SECURITY AND INSURANCE

- 20.01 Article 5 of the General Conditions and Supplementary Conditions, if any, set forth Owner's requirements as to performance and payment bonds and insurance. The Successful Bidder shall deliver such bonds and evidence of insurance coverage within 10 days of receipt of the Notice of Award.

ARTICLE 21 – SIGNING OF AGREEMENT

- 21.01 The Owner will issue a Notice Award to the Successful Bidder in the form included in Bidding Documents. Within 10 days of receipt of the Notice of Award, the Successful Bidder shall comply with the conditions set forth therein and provide requested information.

- 21.02 Based on required reviews and approvals, Owner will thereafter provide the required number of counterparts of the Agreement and other Contract Documents which are identified in the Agreement. The Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and other Contract Documents to Owner within the time specified by the Owner. After obtaining required reviews and approvals for Contract execution, Owner shall return one fully signed counterpart the Agreement and other Contract Documents.

ARTICLE 22 – RETAINAGE

- 22.01 Provisions concerning retainage are set forth in the Agreement.

ARTICLE 23 – CONTRACTOR’S WARRANTY AND GUARANTEES; CORRECTION PERIOD

- 23.01 Provisions concerning Contractor’s general warranty and guarantees and correction period are set forth in Articles 6.19, 13.06, 13.07, 13.09 and 14.03 of the General and Supplementary Conditions, if any.

ARTICLE 24 – EQUAL EMPLOYMENT OPPORTUNITY, ANTI-DISCRIMINATION, AND AFFIRMATIVE ACTION

- 24.01 Provisions regarding the requirements for equal employment opportunity, anti-discrimination, and affirmative action programs, if any, are set forth in the Supplementary Conditions.

ARTICLE 25 – SAFETY AND HEALTH REGULATIONS

- 25.01 This Project is subject to the Safety and Health Regulations of the U.S. Department of Labor set forth in Title 29 CFR, Part 1926 and to all subsequent amendments and other requirements identified in Section 00 73 19 of the Supplementary Conditions.

ARTICLE 26 – SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

- 26.01 Supplementary Instructions to Bidders, if any, are included in Section 00 22 13 and may include certain provisions required by Laws and Regulations and funding agencies. Bidders are solely responsible to determine, obtain, review and interpret the full text of applicable Laws and Regulations.

END OF SECTION

This page intentionally left blank

SECTION 00 41 01

BID FORM

ARTICLE 1 – DEFINED TERMS

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

ARTICLE 2 – BID RECIPIENT

- 2.01 This Bid is submitted to:

**Transfer Station Upgrade Bid
Attention: City Manager
Rockland City Hall
270 Pleasant Street,
Rockland, Maine 04841**

- 2.02 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 3 – BIDDER’S ACKNOWLEDGEMENTS

- 3.01 Bidder accepts all of the terms and conditions of the Bidding Documents including, without limitation:
- A. those dealing with disposition of Bid security;
 - B. those included in the Supplementary Instructions to Bidders;
 - C. insurance and bonding requirements (Payment Bond and Performance Bond each equal to 100% of the total Contract Price) set forth in the General Conditions and Supplementary Conditions, if any;
 - D. Contract Times as set forth in the Agreement; and
 - E. provisions for liquidated damages as set forth in the Agreement.
- 3.02 This Bid will remain subject to acceptance for 90 days after the Bid opening or for such longer period of time that Bidder may agree to in writing upon request of Owner.
- 3.03 Bidder acknowledges receipt of the following Addenda.

Addendum No.

Addendum Date

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

- 3.04 Bidder acknowledges the representations and certifications included in Section 00 45 05 are made a condition of the Bid.

ARTICLE 4 – BASIS OF BID

- 4.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s). **Bidder must complete all items.**

BID PRICES SHALL EXCLUDE SALES AND USE TAX.

LUMP SUM BID PRICE

_____ Dollars and _____ Cents \$ _____
(Use words) (Use figures)

ARTICLE 5 – TIME OF COMPLETION

- 5.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions and Supplementary Conditions, if any, on or before the dates or within the number of calendar days indicated in the Agreement.
- 5.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 6 – ATTACHMENTS TO THIS BID

- 6.01 The following documents are submitted with and made a condition of this Bid:

00 43 13 Bid Bond – Penal Sum Form

OR

Required Bid security in the form of _____

Supplements:

00 43 36 Proposed Subcontractors Form

00 43 93 Bid Submittal Checklist

00 45 05 Bidder's Representations and Certifications including required submittals

00 45 13 Bidder's Qualifications

00 45 19 Non-collusion Affidavit

ARTICLE 7 – BID SUBMITTAL

7.01 This Bid is submitted by:

A Corporation

Corporation Name: _____

State of incorporation: _____

Type: _____
(General Business, Professional, Service, other)

By: _____
(Signature – attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

(CORPORATE SEAL)

Attest: _____
(Signature of Corporate Secretary)

Business Address: _____

Phone & Facsimile Nos: _____

Email address: _____

Date of qualification to do business as out-of-state corporation: _____

A Limited Liability Company (LLC)

LLC Name: _____

State in which organized: _____

By: _____
(Signature – attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Business Address: _____

Phone & Facsimile Nos: _____

Email address: _____

WOODARD & CURRAN

BID FORM
00 41 01-7

A Joint Venture

First Joint Venturer Name: _____

By: _____
(Signature – attach evidence of authority to sign)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

Phone & Facsimile Nos: _____

Email address: _____

Second Joint Venturer Name: _____

By: _____
(Signature – attach evidence of authority to sign)

Name (*typed or printed*): _____

Title: _____

Business Address: _____

Phone & Facsimile Nos: _____

Email address: _____

(Each joint venturer must sign. The manner of signing for each individual, partnership, corporation and limited liability company that is a party to the joint venture should be in the manner indicated above.)

A Partnership

Partnership Name: _____ (SEAL)

By: _____
(Signature of general partner – attach evidence of authority to sign)

Name (typed or printed): _____

Business Address: _____

Phone & Facsimile Nos: _____

Email address: _____

An Individual

Name (typed or printed): _____

By: _____
(Individual's signature)

Doing business as: _____

Business Address: _____

Phone & Facsimile Nos: _____

Email address: _____

SUBMITTED ON:
EIN/FEIN:

Communications concerning this Bid shall be addressed to:

Name: _____

Title: _____

Business Address: _____

Phone & Facsimile Nos: _____

Email address: _____

END OF SECTION

SECTION 00 43 36

PROPOSED SUBCONTRACTORS FORM

The following Subcontractors, other persons and organizations are proposed to be employed to furnish portions of the Work. Attach additional sheets as necessary.

CONSTRUCTION

Name	Address	Type of Construction/ Area of Responsibility	% of Total Contract

END OF SECTION

SECTION 00 43 93

BID SUBMITTAL CHECKLIST

Bidder confirms that the following documents are fully completed, included in and made part of its Bid.

- ☐ 00 41 01 Bid Form
- ☐ 00 43 13 Bid Bond – Penal Sum Form
- OR*
- ☐ Required Bid security in the form of _____

Supplements

- ☐ 00 43 36 Proposed Subcontractors Form
- ☐ 00 45 05 Bidder's Representations and Certifications
 - ☐ **including required documents and submittals**
- ☐ 00 45 13 Bidder's Qualifications
- ☐ 00 45 19 Non-collusion Affidavit
- ☐ One original signed hardcopy (with original Bid security) has been submitted to the Owner in accordance with Section 00 21 13.

CONFIRMED BY BIDDER ON:
By:
<i>Authorized person per Bid Form</i>

END OF SECTION

SECTION 00 45 05

BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

The undersigned, under the penalties of perjury, represents and certifies the following which is made a condition of the Bid.

1.01 Bidder's Representations

- A. Bidder has examined and carefully studied the Bidding Documents and other related data identified in the Bidding Documents.
- B. Bidder has visited the Site 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. Bidder is familiar with and is satisfied as to all 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 contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in Section 00 73 10 of the Supplementary Conditions Paragraph 4.02 as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Section 00 73 10 of the Supplementary Conditions Paragraph 4.06 as containing reliable "technical data."
- E. Bidder has considered the information known to Bidder; 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, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs.
- F. Based on the information and observations referred to in Paragraph E above, Bidder does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of the Bid for performance of the Work at the price(s) 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.

**BIDDER'S REPRESENTATIONS
AND CERTIFICATIONS**

- H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and 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 of the Work for which the Bid is submitted.

1.02 Bidder's Certifications

- A. The 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 and has not solicited or induced any individual or entity to refrain from bidding.
- C. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph:
 - 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.

- D. Bidder will comply with the requirements of the Safety and Health provisions in the Contract Documents, and if Bidder is awarded a Contract, it shall incorporate these provisions into all subcontracts and Purchase Orders so that such provisions will be binding upon each Subcontractor or Supplier.
- E. Bidder will comply with the requirements of the Equal Employment Opportunity, Anti-discrimination, and Affirmative Action Program provisions in the Contract Documents, if any, and if Bidder is awarded a Contract, it shall incorporate these provisions into all subcontracts and Purchase Orders so that such provisions will be binding upon each Subcontractor or Supplier.

SUBMITTED ON:
By:
<i>Authorized person per Bid Form</i>

END OF SECTION

SECTION 00 45 13

BIDDER'S QUALIFICATIONS

The following data, statements of experience, personnel, equipment and general qualifications of the Bidder are submitted as a part of the Bid and the Bidder represents and guarantees the truthfulness and accuracy thereof and **its ability to meet the qualifications requirements specified forth in the General Requirements.** Attach additional sheets as necessary properly cross referenced.

- A. Bidder's organization is a _____
(entity type) and has been in business continuously from the year _____.
- B. Bidder's organization has had experience in construction comparable to that required by the Contract Documents as a prime contractor for _____ years and as a subcontractor for _____ years.
- C. Following is a list of **at least five projects** Bidder's organization has completed **in the state the Project is located, within the last ten years which are similar** in type, and magnitude to that required by the Contract.

Client/Owner Name/Address	Project Name/Location	CURRENT Contact Name, Phone, Email	Time Period

203966.23
Issue Date: March 2018

**TRANSFER STATION UPGRADE
ROCKLAND, MAINE**

Client/Owner Name/Address	Project Name/Location	CURRENT Contact Name, Phone, Email	Time Period

- D. The following supervisory personnel are currently employed by the Bidder and available for assignment to the Project (project manager, superintendents, principal foremen and engineers).

Name	Title	Years of Experience

Attach detailed resumes of qualifications, previous employers and experience for each.

- E. Describe Bidder's 24 hour/7 days per week emergency response and communication capabilities.

- F. Following is a list of all projects Bidder has undertaken in the last 5 years which have resulted in partial or final settlement of the contract by arbitration or litigation.

Name of Client and Project	Contact Name/ Telephone No.	Original Contract Amount	Total Claims	Arbitrated or Litigated Amount of Settlement of Claims

G. Following is a list of safety citations issued to the Bidder over the last 5 years.

Name of Client and Project	Contact Name/ Telephone No.	Type of Citation	Issued by

- H. Following is a list of labor disputes the Bidder has been the subject of, or otherwise been involved in, during the last 5 years. For these purposes, "labor disputes" shall include picketing or any other activity which disrupted or delayed the work. Attach additional sheets as necessary.

Name and Location of the Project	
Nature of the Dispute	
Duration and dates during which the dispute took place	
How the dispute was resolved	
Name and Location of the Project	
Nature of the Dispute	
Duration and dates during which the dispute took place	
How the dispute was resolved	

END OF SECTION

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SECTION 00 45 19

NON-COLLUSION AFFIDAVIT

_____, being duly sworn,
depose and, under the penalty of perjury, say that the following is true:

1. I am the person responsible within my firm for the final decision as to the price(s) and amount of this Bid or, if not, that I have written authorization, enclosed herewith, from that person to make the statements set out below on his or her behalf and on the behalf of my firm.
2. The price(s) and amount of this Bid have been arrived at independently, without collusion, consultation, communication, or agreement for the purpose of restricting competition with any other contractor, competitor, Bidder, or potential Bidder.
3. Unless otherwise required by law, neither the price(s) nor the amount of this Bid have been disclosed to any other firm or person who is a Bidder, competitor, or potential Bidder on the Project, and will not be so disclosed either directly or indirectly prior to Bid opening.
4. No attempt has been made or will be made to solicit, cause, or induce any firm, partnership, corporation, or person to submit or not submit a Bid on this Project, or to submit a Bid higher than the Bid of this firm, or submit an intentionally high or noncompetitive Bid or other form of complementary Bid, or for the purpose of restricting competition.
5. The Bid of my firm is made in good faith and not pursuant to any agreement or discussion with, or inducement from, any firm or person to submit a complementary Bid.
6. My firm has not offered or entered into a subcontracting agreement regarding the purchase of materials or services from any firm or person, or offered, promised, or paid cash or anything of value to any firm or person, whether in connection with this or any other Project, in consideration for an agreement or promise by any firm or person to refrain from proposing or to submit a complementary Bid on the Project.
7. My firm has not accepted nor been promised any subcontract or agreement regarding the sale of materials or services to any firm or person, and has not been promised or paid cash or anything of value to any firm or person, whether in connection with this or any other project, in consideration for my firm's submitting a complementary Bid or agreeing to do so, on the Project.

8. I have made a diligent inquiry of all members, officers, employees, and agents of my firm with responsibilities relating to the preparation, approval, or submission of my firm's Bid on the Project and have been advised by each of them that he or she has not participated in any communication, consultation, discussion, agreement, collusion, act, or other conduct inconsistent with any of the statements and representations made in this affidavit.

Company Name

Signature

Company Position

Date: _____

Attest: _____

Date: _____

END OF SECTION

SAMPLE NOTICE OF AWARD (C-00 51 00)

Date: _____

Project:

Owner:

Owner's Contract No.:

Contract:

Engineer's Project No.:

Bidder:

Bidder's Address:

You are notified that your Bid dated [_____] for the above Contract has been considered. You are the Successful Bidder and are awarded a Contract for [_____] subject to the following conditions being met and subject to required reviews and approvals. [*and specifically, *funding* approval by [_____] .*]

The *Lump Sum* *Total* Contract Price of your Contract is _____ Dollars (\$ _____).

You must comply with the following conditions precedent **within 10 days** of the date you receive this Notice of Award.

1. Deliver the Contract security (Bonds) as specified in the General Conditions and Supplementary Conditions (Articles 2 and 5);
2. Deliver the insurance certificates indicating coverages as specified in the General Conditions and Supplementary Conditions (Articles 2 and 5);
3. Deliver the following completed and executed certifications and documents:
 - a. *LIST ITEMS FOR CONTRACTOR TO PROVIDE*
 - b. Items to be provided by Subcontractors:

LIST

SAMPLE NOTICE OF AWARD (C-00 51 00)

Other conditions precedent:

LIST OTHERS IF ANY

Failure to comply with the above conditions within the time specified will entitle the Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

After confirming that you have complied with the above conditions *and required approvals are obtained,* Owner will deliver the conformed Contract Documents for execution.

Owner

By: _____

Authorized Signature

Title

Copy to Engineer

SECTION 00 52 10

AGREEMENT FORM

THIS AGREEMENT is by and between _____ (“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 upgrades to the existing transfer station building and includes the following principal features:
- A. Saw-cutting openings in existing operating floor concrete slab and building foundation wall;
 - B. Construction of concrete curbing, safety railings and truck guide rails;
 - C. Infilling existing floor opening with grating;
 - D. Construction of partition screen wall;
 - E. Upgrades to ground floor concrete slab;
 - F. Relocation of one existing hopper (Hopper #2) and compactor; and
 - G. Electrical and lighting upgrades.

ARTICLE 2 – THE PROJECT

- 2.01 The Project under the Contract Documents is generally described as Transfer Station Upgrades.

ARTICLE 3 – ENGINEER

- 3.01 The Project has been designed by Woodard & Curran, Inc. (Engineer), which is 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 *Substantial Completion and Final Payment*

- A. The Work shall be substantially complete by September 14, 2018 and completed and ready for final payment by September 28, 2018 in accordance with Paragraph 14.07 of the Standard General and Supplementary Conditions, if any.

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 loss if the Work is not completed within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with Article 12 of the Standard General Conditions and Supplementary Conditions, if any. The parties also recognize the delays, expense, and difficulties 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), Contractor shall pay Owner **\$225.00** for each day that expires after the time specified in Paragraph 4.02 above for Substantial Completion until the Work is substantially complete. After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by Owner, Contractor shall pay Owner **\$225.00** for each day that expires after the time specified in Paragraph 4.02 above for completion and readiness for final payment until the Work is completed and ready for final payment.

ARTICLE 5 – CONTRACT PRICE

- 5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds as follows:

LUMP SUM PRICE

[IN WORDS] Dollars and [# OF CENTS] Cents

[\$[DOLLAR AMOUNT]]

ARTICLE 6 – PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

- A. Contractor shall submit Applications for Payment in accordance with Article 14 of the Standard General Conditions and Supplementary Conditions, if any. Applications for Payment will be processed by Engineer as provided in the Standard General Conditions and Supplementary Conditions, if any, and the General Requirements.

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 15th day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below. All such payments will be

measured by the schedule of values established as provided in Paragraph 2.07.A of the Standard General Conditions and Supplementary Conditions, if any, (and in the case of Unit Price Work based on the number of units completed).

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 Engineer may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 14.02 of the Standard General Conditions and Supplementary Conditions, if any, and additional retainage allowed by Laws and Regulations.
 - a. Progress Payments of 90 percent for Work completed (with the balance of 10 percent being retainage); and
2. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 95 percent of the Work completed (with the balance of 5 percent being retainage), less such amounts as Engineer shall determine in accordance with Paragraph 14.02.B.5 of the General and Supplementary Conditions, if any, and less the Engineer's estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected (Punch List) attached to the certificate of Substantial Completion and subject to Paragraph 14.04 of the General and Supplementary Conditions, if any.

6.03 *Final Payment*

- A. Upon final completion and acceptance of the Work in accordance with Paragraph 14.07 of the General and Supplementary Conditions, if any, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 14.07.

ARTICLE 7 – INTEREST

- 7.01 All moneys not paid when due as provided in Article 14 of the General and Supplementary Conditions, if any, shall bear interest *comparable to current short term lending rates in the state where the Project is located or allowed by Laws and Regulations. Interest shall not be accrued on retainage.*

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS AND CERTIFICATIONS

- 8.01 In order to induce Owner to enter into this Agreement, Contractor makes the following representations:
 - A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.
 - B. Contractor has visited the Site 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 federal, state, and local 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 contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities), if any, that have been identified in Paragraph SC-4.02 of the Supplementary Conditions as containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Paragraph SC-4.06 of the Supplementary Conditions as containing reliable "technical data."
- E. Contractor has considered the information known to Contractor; 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, techniques, sequences, and procedures of construction to be employed by Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents; and (3) Contractor's safety precautions and programs.
- F. Based on the information and observations referred to in Paragraph 8.01.E above, Contractor does not consider that 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 Documents.
- 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.

8.02 The Contractor certifies, under the penalties of perjury, that:

- A. Contractor has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph:
 - 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 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
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.
5. Contractor will incorporate the applicable provisions of the Contract Documents into all subcontracts and Purchase Orders so that such provisions will be binding upon each Subcontractor or Supplier.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 *Contents*

A. The Contract Documents consist of the following:

1. This Agreement
2. Items listed in Section 00 54 00
3. Forms listed in 00 60 00
4. Standard General Conditions in Section 00 72 05
5. Supplementary Conditions listed in Section 00 73 05
6. General Requirements, Specifications and Drawings as listed in the table of contents of the Contract Documents
7. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
 - a. Notice to Proceed
 - b. Work Change Directives
 - c. Change Orders

B. The documents listed in Paragraph 9.01.A are attached to this Agreement and made a part hereof.

- 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 Paragraph 3.04 of the Standard General Conditions and Supplementary Conditions, if any.

ARTICLE 10 – MISCELLANEOUS

10.01 *Terms*

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

10.02 *Assignment of Contract*

- A. 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, moneys that may become due and moneys that are 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 partners, successors, assigns, and legal representatives to the other party hereto, its partners, 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.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement. Counterparts have been delivered to Owner and Contractor. All portions of the Contract Documents have been signed or have been identified by Owner and Contractor or on their behalf.

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

OWNER:

City of Rockland, Maine

By:

Printed Name

Title

By:

Printed Name

Title

CONTRACTOR:

By:

Printed Name

Title

License No.

Attest:

Title

Address for giving notices:

Attest:

Title

Address for giving notices:

Agent for service of process:

(If Owner is a corporation, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.)

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

203966.23
Issue Date: April 2018

**TRANSFER STATION UPGRADE
ROCKLAND, MAINE**

Approved as to Form by:

Counsel

WOODARD & CURRAN

**AGREEMENT FORM
00 52 10-8**

PERFORMANCE BOND (Form C-006113.13)

CONTRACTOR *(name and address):*

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

OWNER *(name and address):*

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location):*

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

SURETY

(seal)

Contractor's Name and Corporate Seal

(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 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:

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PAYMENT BOND (Form C-006113.16)

CONTRACTOR *(name and address):*

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

OWNER *(name and address):*

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location):*

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:

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SAMPLE NOTICE TO PROCEED (C-00 55 00)

Date: _____

Project:

Owner:

Owner's Contract No.:

Contract:

Engineer's Project No.:

Contractor:

Contractor's Address: [send Certified Mail, Return Receipt Requested]

NOTICE TO PROCEED

You are notified that the Contract Times under the above Contract will commence to run on _____. On or before that date, you are to start performing your obligations under the Contract Documents [* for the following portion(s) of the Work: *]
[*Describe the limits of the Work covered*]

[*A Notice to Proceed for the remaining Work will follow. *]

In accordance with Article 4 of the Agreement, the date of Substantial Completion is _____, and the date of readiness for final payment is _____ [OR the number of days to achieve Substantial Completion is _____, and the number of days to achieve readiness for final payment is _____].

Before you may start any Work at the Site, Paragraph 2.01.B of the General Conditions, and Supplementary Conditions if any, provide that you and Owner must each deliver to the other (with copies to Engineer and other identified additional insureds and loss payees) certificates of insurance which each is required to purchase and maintain in accordance with the Contract Documents.

SAMPLE NOTICE TO PROCEED (C-00 55 00)

Also, before you may start any Work at the Site, you must:

Comply with Articles 2.05 and 2.06 of the General and Supplementary Conditions (if any)

*[*add other requirements*]*

Owner

Given by:

Authorized Signature

Title

Date

Copy to Engineer

SECTION 00 60 00

PROJECT FORMS

The following forms are included in this Section and shall be used for the Project as specified in the General Conditions and Supplementary Conditions if any, and the General Requirements. Completed and execution versions of these forms used during the Project shall be incorporated into the Agreement and made a part thereof.

Application for Payment Form (C-00 62 76)
Request for Interpretation/Information Form (C-00 63 15)
Field Order Form (C-00 63 36)
Work Change Directive Form (C-00 63 49)
Change Request Form (C- 00 63 60)
Change Order Form (C-00 63 63)
Notice of Substantial Completion Form (C-00 65 15)
Certificate of Substantial Completion Form (C-00 65 16)
Notice of Completion Form (C-00 65 18)

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	Application Period:	Application Date:
To (Owner):	From (Contractor):	Via (Engineer):
Project:	Contract:	
Owner's Contract No.:	Contractor's Project No.:	Engineer's Project No.:

**Application For Payment
Change Order Summary**

Approved Change Orders			1. ORIGINAL CONTRACT PRICE..... \$
Number	Additions	Deductions	2. Net change by Change Orders..... \$
			3. Current Contract Price (Line 1 ± 2)..... \$
			4. TOTAL COMPLETED AND STORED TO DATE (Column F on Progress Estimate)..... \$
			5. RETAINAGE:
			a. X Work Completed..... \$
			b. X Stored Material..... \$
			c. Total Retainage (Line 5a + Line 5b)..... \$
			6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5c)..... \$
			7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application)..... \$
			8. AMOUNT DUE THIS APPLICATION..... \$
			9. BALANCE TO FINISH, PLUS RETAINAGE (Column G on Progress Estimate + Line 5 above)..... \$
TOTALS			
NET CHANGE BY CHANGE ORDERS			

Contractor's Certification

The undersigned Contractor certifies that to the best of its knowledge: (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 Work covered by prior Applications for Payment; (2) title of 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 Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

By:

Date:

Payment of: \$ _____
(Line 8 or other - attach explanation of the other amount)

is recommended by: _____ (Date)
(Engineer)

Payment of: \$ _____
(Line 8 or other - attach explanation of the other amount)

is approved by: _____ (Date)
(Owner)

Approved by: _____ (Date)
Funding Agency (if applicable)

Approved by: _____

FORM C-00 62 76

[illegible]

FORM C-00 62 76

Contractor's Application

[illegible]

Stored Material Summary **FORM C-00 62 76**

Contractor's Application

[illegible]

**REQUEST FOR
INTERPRETATION/INFORMATION
(Form C-00 63 15)**

RFI #: _____ ☐ **Attachment**

To: _____

From: _____

Attn: _____

Issue Date: _____

Project: _____

Required Reply Date: _____

DISTRIBUTION:

Contractor

Owner

Engineer

☐ _____

☐ _____

☐ _____

☐ _____

☐ _____

☐ _____

☐ _____

☐ _____

☐ _____

REFERENCES:

- Specifications: _____ Section: _____ Page/Paragraph: _____
- Drawings: _____ Issue Date: _____ Detail/Sections: _____
- Work Area: _____ Grid/Level: _____

RFI DESCRIPTION:

From: _____

Tel No: _____ Fax: No: _____

Initial: _____

E-mail: _____

RFI REPLY: (response may be transmitted in separate document)

Possible Cost Effect Yes: ☐ No: ☐

Possible Schedule Effect Yes: ☐ No: ☐

From: _____

Reply Date: _____ xc: _____

Initial: _____

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Field Order (C-00 63 36)

No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

Attention:

You are hereby directed to promptly execute this Field Order issued in accordance with General Conditions Paragraph 9.04.A, for minor changes in the Work without changes in Contract Price or Contract Times. If you consider that a change in Contract Price or Contract Times is required, please notify the Engineer immediately and before proceeding with this Work.

Reference: _____
(Specification Section(s)) (Drawing(s) / Detail(s))

Description:

Attachments:

Engineer:

Receipt Acknowledged by Contractor:	Date:
-------------------------------------	-------

Copy to Owner

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Work Change Directive (Form C-00 63 49)

No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

Contractor is directed to proceed promptly with the following change(s):

Item No.	Description

Attachments (list documents supporting change):

Purpose for Work Change Directive:

Authorization for Work described herein to proceed on the basis of Cost of the Work due to:

- ☐ Nonagreement on pricing of proposed change.
- ☐ Necessity to expedite Work described herein prior to agreeing to changes on Contract Price and Contract Time.

Estimated change in Contract Price and Contract Times:

Contract Price \$ _____ (increase/decrease) Contract Time _____ (increase/decrease)
days

Recommended for Approval by Engineer:	Date
Authorized for Owner by:	Date
Received for Contractor by:	Date
Received by Funding Agency (if applicable):	Date:

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CHANGE REQUEST (FORM C-00 63 60)

(Design Changes/Deviations/Substitutions)

CR NO.
DATE

Project:

Request Initiated by:

- ☐ Contractor
☐ Owner
☐ Engineer

Impact to Contract Price expected ☐

Impact to Contract Time expected ☐

Change Orders will be processed separately

Request submitted as (format):

Description of Change (☐ documentation attached)

Reason for Change

Response: ☐ This constitutes a Written Amendment to the Agreement.

Review of the proposed change/deviation/substitution by Engineer is for general compatibility with the design concept of the Project. This review does not extend to means, methods, sequences, or procedures of construction or to issues of safety incident thereto. This review shall not relieve the Contractor from responsibility for full compliance with the requirements specified and to determine and verify the information contained therein.

<p>Recommended By Engineer for Acceptance (subject to above comments if any)</p> <p><input type="checkbox"/> recommended for processing and approval under a separate Change Order</p> <p>NAME:</p> <p>_____ <i>Signature</i> <i>Date</i></p>	<p><input type="checkbox"/> Approved by Owner (no schedule or cost impact)</p> <p><input type="checkbox"/> Acknowledged by Owner – to be processed and approved under a separate Change Order</p> <p>NAME:</p> <p>_____ <i>Signature</i> <i>Date</i></p>
<p>Approved by Contractor</p> <p><input type="checkbox"/> Change Order to be requested</p> <p>NAME:</p> <p>_____ <i>Signature</i> <i>Date</i></p>	

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Change Order (Form C-00 63 63)

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 with all 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):

Date: _____

ACCEPTED:

By: _____

Owner (Authorized Signature)

Date: _____

Approved by Funding Agency (if applicable):

Date: _____

ACCEPTED:

By: _____

Contractor (Authorized Signature)

Date: _____

Approved by Funding Agency (if applicable):

Date: _____

Change Order

Instructions

A. GENERAL INFORMATION

This document was developed to provide a uniform format for handling contract changes that affect Contract Price or Contract Times. Changes that have been initiated by a Work Change Directive must be incorporated into a subsequent Change Order if they affect Price or Times.

Changes that affect Contract Price or Contract Times should be promptly covered by a Change Order. The practice of accumulating Change Orders to reduce the administrative burden may lead to unnecessary disputes.

If Milestones have been listed in the Agreement, any effect of a Change Order thereon should be addressed.

For supplemental instructions and minor changes not involving a change in the Contract Price or Contract Times, a Field Order should be used.

B. COMPLETING THE CHANGE ORDER FORM

Engineer normally initiates the form, including a description of the changes involved and attachments based upon documents and proposals submitted by Contractor, or requests from Owner, or both.

Once Engineer has completed and signed the form, all copies should be sent to Owner or Contractor for approval, depending on whether the Change Order is a true order to the Contractor or the formalization of a negotiated agreement for a previously performed change. After approval by one contracting party, all copies should be sent to the other party for approval. Engineer should make distribution of executed copies after approval by both parties.

If a change only applies to price or to times, cross out the part of the tabulation that does not apply.

Notice of Substantial Completion (C-00 65 15)

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		

This NOTICE of Substantial Completion applies to:

☐ The following Systems, Equipment or specified portions ☐ : All Work under the Contract Documents
:

Date of Substantial Completion for above

The following documents are attached to and made part of this Notice.

Submitted by Contractor Date

This page intentionally left blank

Certificate of Substantial Completion (Form C-00 65 16)

Project:

Owner:

Owner's Contract No.:

Contract:

Engineer's Project No.:

This [tentative] [definitive] Certificate of Substantial Completion applies to:

- ☐ All Work under the Contract Documents: ☐ The following specified portions of the Work:

Date of Substantial Completion

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 Project or portion thereof designated above is hereby declared and is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below.

A [tentative] [definitive] list of items to be completed or corrected is attached hereto. 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.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as provided in the Contract Documents except as amended as follows:

- ☐ Amended Responsibilities ☐ Not Amended

Owner's Amended Responsibilities:

Contractor's Amended Responsibilities:

The following documents are attached to and made part of this Certificate:

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.

<hr/> Executed by Engineer	<hr/> Date
----------------------------	------------

<hr/> Accepted by Contractor	<hr/> Date
------------------------------	------------

<hr/> Accepted by Owner	<hr/> Date
-------------------------	------------

Notice of Completion (Form C-00 65 18)

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		

This NOTICE of Completion applies to:

- ☐ All Work under the Contract Documents: ☐ The following specified portions:

Date of final Completion

The Work to which this Notice applies is ready for inspection by authorized representatives of Engineer and Owner. Contractor has completed all corrections, delivered all required documentation, and the Project, or portion designated above, is complete. The Date of Completion of the Project or portion thereof designated above is hereby declared by the Contractor.

The following documents are attached to and made part of this Certificate:

Final Punchlist

Final Application for Payment

Only the **making and acceptance of final payment** will constitute:

1. A waiver of all claims by Owner against Contractor, except claims arising from any unsettled liens, from Defective Construction appearing after final inspection; from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
2. A waiver of all claims by Contractor against Owner other than those previously timely made in writing and still unsettled.

Submitted by Contractor

Date

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This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

SECTION 00 72 05 STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly by



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AMERICAN SOCIETY OF CIVIL ENGINEERS

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A Practice Division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Endorsed by



CONSTRUCTION SPECIFICATIONS INSTITUTE

**REVISIONS HIGHLIGHTED WITHIN THE TEXT OF THIS SECTION
HAVE BEEN PREPARED BY WOODARD & CURRAN**

These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor (EJCDC C-520 or C-525, 2007 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the Narrative Guide to the EJCDC Construction Documents (EJCDC C-001, 2007 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (EJCDC C-800, 2007 Edition).

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SECTION 00 72 05
STANDARD GENERAL CONDITIONS OF THE
CONSTRUCTION CONTRACT

TABLE OF CONTENTS

	Page
Article 1 – Definitions and Terminology	1
1.01 Defined Terms.....	1
1.02 Terminology	5
Article 2 – Preliminary Matters	7
2.01 Delivery of Bonds and Evidence of Insurance.....	7
2.02 Copies of Documents.....	7
2.03 Commencement of Contract Times; Notice to Proceed	7
2.04 Starting the Work.....	7
2.05 Before Starting Construction	8
2.06 Preconstruction Conference; Designation of Authorized Representatives	8
2.07 Initial Acceptance of Schedules	8
Article 3 – Contract Documents: Intent, Amending, Reuse.....	9
3.01 Intent.....	9
3.02 Reference Standards	9
3.03 Reporting and Resolving Discrepancies	10
3.04 Amending and Supplementing Contract Documents	11
3.05 Reuse of Documents	11
3.06 Electronic Data.....	11
Article 4 – Availability of Lands; Subsurface and Physical Conditions; Hazardous Environmental Conditions; Reference Points	12
4.01 Availability of Lands	12
4.02 Subsurface and Physical Conditions	12
4.03 Differing Subsurface or Physical Conditions.....	13
4.04 Underground Facilities	14
4.05 Reference Points	15
4.06 Hazardous Environmental Condition at Site.....	16
Article 5 – Bonds and Insurance	17
5.01 Performance, Payment, and Other Bonds	17
5.02 Licensed Sureties and Insurers	18
5.03 Certificates of Insurance	18
5.04 Contractor’s Insurance.....	19
5.05 Owner’s Liability Insurance	21
5.06 Property Insurance	22

5.07	Waiver of Rights	23
5.08	Receipt and Application of Insurance Proceeds (Not used)	24
5.09	Acceptance of Bonds and Insurance; Option to Replace.....	24
5.10	Partial Utilization, Acknowledgment of Property Insurer	25
Article 6 – Contractor’s Responsibilities		25
6.01	Supervision and Superintendence	25
6.02	Labor; Working Hours.....	25
6.03	Services, Materials, and Equipment	25
6.04	Progress Schedule	26
6.05	Substitutes and “Or-Equals”	26
6.06	Concerning Subcontractors, Suppliers, and Others	29
6.07	Patent Fees and Royalties	31
6.08	Permits.....	31
6.09	Laws and Regulations	32
6.10	Taxes	32
6.11	Use of Site and Other Areas	32
6.12	Record Documents.....	33
6.13	Safety and Protection	33
6.14	Safety Representative	34
6.15	Hazard Communication Programs	34
6.16	Emergencies	35
6.17	Shop Drawings and Samples	35
6.18	Continuing the Work	37
6.19	Contractor’s General Warranty and Guarantee.....	37
6.20	Indemnification	39
6.21	Delegation of Professional Design Services	40
Article 7 – Other Work at the Site.....		40
7.01	Related Work at Site	40
7.02	Coordination.....	41
7.03	Legal Relationships.....	41
Article 8 – Owner’s Responsibilities		42
8.01	Communications to Contractor.....	42
8.02	Replacement of Engineer.....	42
8.03	Furnish Data	42
8.04	Pay When Due	42
8.05	Lands and Easements; Reports and Tests	42
8.06	Insurance	42
8.07	Change Orders.....	42
8.08	Inspections, Tests, and Approvals	43
8.09	Limitations on Owner’s Responsibilities	43
8.10	Undisclosed Hazardous Environmental Condition.....	43
8.11	Evidence of Financial Arrangements	43
8.12	Compliance with Safety Program.....	43

Article 9 – Engineer’s Status During Construction	43
9.01 Owner’s Representative	43
9.02 Visits to Site	43
9.03 Project Representative	44
9.04 Authorized Variations in Work	47
9.05 Rejecting Defective Work	47
9.06 Shop Drawings, Change Orders and Payments	48
9.07 Determinations for Unit Price Work	48
9.08 Decisions on Requirements of Contract Documents and Acceptability of Work	48
9.09 Limitations on Engineer’s Authority and Responsibilities.....	49
9.10 Compliance with Safety Program.....	49
Article 10 – Changes in the Work; Claims	50
10.01 Authorized Changes in the Work	50
10.02 Unauthorized Changes in the Work	50
10.03 Execution of Change Orders.....	50
10.04 Notification to Surety.....	50
10.05 Claims.....	51
Article 11 – Cost of the Work; Allowances; Unit Price Work.....	52
11.01 Cost of the Work	52
11.02 Allowances	55
11.03 Unit Price Work	55
Article 12 – Change of Contract Price; Change of Contract Times	56
12.01 Change of Contract Price.....	56
12.02 Change of Contract Times	57
12.03 Delays	57
Article 13 – Tests and Inspections; Correction, Removal or Acceptance of Defective Work.....	58
13.01 Notice of Defects	58
13.02 Access to Work	58
13.03 Tests and Inspections	58
13.04 Uncovering Work.....	59
13.05 Owner May Stop the Work.....	60
13.06 Correction or Removal of Defective Work.....	60
13.07 Correction Period.....	60
13.08 Acceptance of Defective Work	61
13.09 Owner May Correct Defective Work	61
Article 14 – Payments to Contractor and Completion.....	62
14.01 Schedule of Values	62
14.02 Progress Payments	62
14.03 Contractor’s Warranty of Title	65
14.04 Substantial Completion.....	65
14.05 Partial Utilization	66
14.06 Final Inspection.....	67

14.07 Final Payment	67
14.08 Final Completion Delayed.....	69
14.09 Waiver of Claims	69
Article 15 – Suspension of Work and Termination	69
15.01 Owner May Suspend Work	69
15.02 Owner May Terminate for Cause.....	69
15.03 Owner May Terminate For Convenience.....	71
15.04 Contractor May Stop Work or Terminate	71
Article 16 – Dispute Resolution	72
16.01 Methods and Procedures.....	72
Article 17 – Miscellaneous.....	73
17.01 Giving Notice.....	73
17.02 Computation of Times	73
17.03 Cumulative Remedies	73
17.04 Survival of Obligations	73
17.05 Controlling Law	73
17.06 Headings.....	74
17.07 Professional Fees and Court Costs Included.....	74

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. 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 which is evidence of the agreement between Owner and Contractor covering the Work.
 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. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
 5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed. May also be referred to as “Proposal” which may be used interchangeably and shall have the same meaning.
 6. *Bidder*—The individual or entity who submits a Bid directly to Owner.
 7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).
 8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.
 9. *Change Order*—A document recommended by Engineer 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, issued on or after the Effective Date of the Agreement.
 10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
 11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.
13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).
14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.
15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.
16. *Cost of the Work*—See Paragraph 11.01 for definition.
17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor and complement the Specifications. Shop Drawings and other Contractor submittals are not Drawings as so defined. May also be referred to as "Plans", which may be used interchangeably and shall have the same meaning. Notes on Drawings are directed to Contractor unless specifically noted otherwise.
18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
19. *Engineer*—The individual or entity named as such in the Agreement.
20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
21. *General Requirements*—Sections of Division 01 of the Specifications which govern the Work in all sections of the Specifications.
22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.
23. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.
27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
28. *Notice to Proceed*—A written notice given 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 under the Contract Documents.
29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
30. *PCBs*—Polychlorinated biphenyls.
31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
32. *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. May also be referred to as "Construction Schedule", which may be used interchangeably and shall have the same meaning.
33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
34. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
35. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.
37. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

39. *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.
40. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
41. *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 for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto. The Specifications are based on the guidelines of the Construction Specifications Institute (CSI) Project Resource Manual, and are directed to Contractor unless specifically noted otherwise. The words "shall be" are included by inference where a colon (:) is used within sentences or phrases in the Specifications.
43. *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 at the Site.
44. *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.
45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.
46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.
47. *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 Subcontractor.
48. *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 those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
49. *Unit Price Work*—Work to be paid for on the basis of unit prices.

50. *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, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

B. Additional Terms

1. *Final Completion*—The time at which all Work is completed and ready for final payment in accordance with Paragraph 14.07 of these General Conditions.
2. *Industry Practice*—The written practices, methods, materials, supplies and equipment, as changed from time to time, that are commonly used in the industry applicable to the Project to design, construct and operate facilities and plants, or any practices, methods and acts, which in the exercise of reasonable judgment in light of the facts known at the time, could have been expected to accomplish the desired results consistent with good business practices, reliability, safety and expedition.
3. *Punch List*—A list of open items representing portions of the Work which Contractor, Engineer, Owner reasonably agree is not complete on the date of Substantial Completion but which items will not significantly interfere with the safe, reliable operation and integrity of the Project or its intended use.
4. *Purchase Order*—A written agreement between Contractor and a Supplier for provision of material and equipment.
5. *Warranty Period*—The correction period after the date of Substantial Completion per Paragraph 13.07 of these General Conditions.

1.02 Terminology

- A. The words and terms discussed in Paragraph 1.02.B through F 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 Paragraph 9.09 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. See also Paragraph 17.02 of these General Conditions.

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 14.04 or 14.05).

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. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied.
- 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. ~~When Contractor delivers the executed counterparts~~Prior to execution of the Agreement ~~to Owner~~, Contractor shall ~~also~~ deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Insurance:* Prior to execution of the Agreement and b~~Before~~ any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor up to ~~ten~~ 5 printed or hard copies of the Contract Documents or Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *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 Agreement 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 Agreement. In no event will the Contract Times commence to run later than the ~~sixtieth~~ 90th day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, unless mutually agreed otherwise, whichever date is earlier.

2.04 *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 the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), 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 Documents and the lead times for equipment and materials per the listing in subparagraph 2.05.A.4;
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. Component parts and categories of Work shall not be limited to those included in the Bid Form. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work; and-
4. a complete listing of equipment and materials with lead times between placing orders and delivery, including normal allowances of time for processing and correcting Shop Drawings.

B. *Evidence of Insurance:* In accordance with Paragraph 2.01.

2.06 *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 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, 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 instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.07 *Initial Acceptance of Schedules*

- A. 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 2.05.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 component parts of the Work.
4. Contractor's listing of equipment and materials with lead times must be reflected in the Progress Schedule. All orders for long lead items shall be placed within 30 days after Effective Date of the Agreement if delivery is critical to scheduling. Failure to place orders in accordance the Progress Schedule may result in full liability for liquidated damages if Milestones and Contract Times are not met.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all and comprise the entire agreement between Owner and Contractor concerning the Work. If any term or provision of any of the Contract Documents, or the application thereof to any party or circumstance shall, to any extent, be determined to be invalid or unenforceable, the remaining provisions of the Contract Documents, or the application of such term or provision to parties or circumstances other than those as to which it is held invalid or unenforceable, shall not be affected thereby, and each term and provision of each of the Contract Documents shall be valid and shall be enforced to the fullest extent permitted by Laws and Regulations.
- 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. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.
- C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

- A. Standards, Specifications, Codes, Laws, and Regulations
 1. Reference to standards, specifications, manuals, 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, code, or Laws or

Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement 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, 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 Contract Documents. 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 Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. Reporting Discrepancies:

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
2. *Contractor's Review of Contract Documents During Performance of Work:* If, 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) any standard, specification, manual, or code, or (c) 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 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.
3. Contractor shall ~~not~~ be liable to Owner or Engineer for failure to report any such conflict, error, ambiguity, or discrepancy in the Contract Documents unless-if Contractor had actual knowledge knew or reasonably should have known of such conflict, error, ambiguity, or discrepancy thereof.

B. Resolving Discrepancies:

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
 - a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); 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 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
 - 1. A Field Order;
 - 2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or
 - 3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

- A. Contractor and any Subcontractor or Supplier 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
 - 2. 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.
- 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.

3.06 *Electronic Data*

- A. ~~Unless otherwise stated in the Supplementary Conditions, the~~ The data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies), files transmitted in in portable document format (PDF), and other electronic media formats of text, data, graphics or other file types supported by any digital document exchange system implemented for the Project, all of which are understood by all parties to constitute official Project correspondence and submittals . ~~Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk.~~ If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.
- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *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. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.
- 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 the Work is to be performed 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.

4.02 *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 contiguous to the Site; and
 - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "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.

4.03 *Differing Subsurface or Physical Conditions*

- A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed 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 4.02 is materially inaccurate; or
 2. is of such a nature as to require a change in the Contract Documents; 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 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

- B. *Engineer's Review:* After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, ~~determine the necessity of Owner's obtaining additional exploration or tests with respect thereto,~~ and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.
- C. Possible Price and Times Adjustments:
1. The Contract Price or the Contract Times, or both, ~~will~~may be equitably adjusted to the extent that the existence of such differing subsurface or physical condition 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 meet any one or more of the categories described in Paragraph 4.03.A; and

- 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 Paragraphs 9.07 and 11.03.
- 2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
 - a. Contractor knew of the existence of such conditions at the time Contractor made a final 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
 - b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; ~~or~~
 - c. Contractor failed to give the written notice as required by Paragraph 4.03.A, or
 - e.d. written notice is submitted after final payment.
- 3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or 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) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

- A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous 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 shall not be responsible for 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 such information and data;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents;
 - c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and

- d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. Not Shown or Indicated:

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, 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 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated ~~or not shown or indicated with reasonable accuracy~~ in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.
3. Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, shall not be liable to Contractor for any Claims for losses or damages incurred by Contractor related to Underground Facilities not shown or indicated (including but not limited to all fees and changes of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs).

4.05 *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.

4.06 *Hazardous Environmental Condition at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the “technical data” contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such “technical data” is identified in the Supplementary Conditions. Except for such reliance on such “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 any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work unless Contractor caused or contributed to such Hazardous Environmental Condition. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.
- D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) 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 4.06.E.
- E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. 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, either party may make a Claim therefor as provided in Paragraph 10.05.

- F. 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. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.
- G. 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: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- H. 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 a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish performance and payment bonds, 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 Documents. 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 13.07, whichever is later, except as provided otherwise by Laws or

Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.

- B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds 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 each bond.
- C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20-5 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

- A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

- A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance and a letter from Contractor's insurance company(s) and agents confirming types and limits of coverage (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.
- B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.
- C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.
- D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.

- E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.04 *Contractor's Insurance*

- A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed, complies with the requirements of Article 5, and as will provide protection from claims set forth below which 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:
1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
 2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
 3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
 4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:
 - a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
 - b. by any other person for any other reason;
 5. 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; ~~and~~
 6. 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;
 7. claims arising out of violation of Laws or Regulations; and
 8. claims for damages because of negligent acts, errors and omissions arising out of performing or providing professional services.
- B. The policies of insurance required by this Paragraph 5.04 shall:
1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.68 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be ~~listed-included~~ as additional insureds, and 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;

2. include at least the specific coverages and be written for not less than the limits of liability provided herein and in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;
3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until ~~at least 30 days~~ prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide) and will contain waiver provisions in accordance with Paragraph 5.07;
5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and
6. include completed operations coverage:
 - a. Such insurance shall remain in effect for two years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

7. In the event general liability insurance is provided on a claims-made policy, the retroactive date of such policy shall not be later than the date of the Notice to Proceed or the Effective Date of the Agreement, whichever is earlier. For construction periods extending beyond the expiration date of an initial claims-made policy, the retroactive date of all subsequent claims-made policies shall not be later than the date of the Notice to Proceed.

C. The limits of liability for the insurance required by Paragraph 5.04 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 coverage:

<u>Minimum limit of liability</u>	<u>Statutory</u>
<u>Applicable Federal (e.g., Longshoreman's)</u>	<u>Statutory</u>
<u>Employer's Liability</u>	<u>\$1,000,000</u>

2. Contractor's General Liability:

\$1,000,000 per occurrence; \$2,000,000 general aggregate; including:

- Broad Form Property Damage Liability including coverage for acts of terrorism
- Completed Operations and Product Liability
- Contractual Liability
- Independent Contractors
- Explosion, Collapse & Underground Hazards
- Personal Injury Coverage, Exclusion Deleted
- Damage to Rented Premises
- Medical Expenses

Pollution Liability (covering third-party injury and property damage claims, including clean-up costs, as a result of pollution conditions arising from the Contractor's operations and completed operations maintained for no less than three years after final completion): \$1,000,000

Excess or Umbrella Liability: \$5,000,000 per occurrence; \$5,000,000 general aggregate

3. Automobile Liability under Paragraph 5.04.A.6 of the General Conditions:

Combined Single Limit of \$1,000,000 for bodily injury & property damage covering Contractor and any vehicles owned, hired and non-owned by the Contractor

4. Professional Liability (E&O for engineers, architects or surveyors): \$1,000,000 for each claim with an annual aggregate of at least \$2,000,000 if professional services are required under the Specifications

5. Owners Protective Liability: as may be specified in the Supplementary Conditions

Any self-insured retention (not allowed for Worker's Compensation) and/or deductibles must be identified and cannot exceed \$100,000 per occurrence without the prior approval of the Owner. Contractor must provide either an audited financial statement to confirm solvency or a letter of credit guaranteeing the \$100,000 in case of loss for the duration of the Project and for the Correction Period.

5.05 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, 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 (ongoing and completed) under the Contract Documents.

5.06 Property Insurance

- A. ~~Unless otherwise provided in the Supplementary Conditions, Owner may, in its discretion, purchase and maintain property insurance upon the Work at the Site. Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof. Contractor shall be responsible for any (subject to such deductible amounts or self-insured retention as may be provided in the Supplementary Conditions or required by Laws and Regulations).~~ This insurance shall:
1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;
 2. be written on a ~~Builder's Risk "all-risk"~~ Special Forms 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 special form~~ perils or causes of loss, including but not limited to: fire, lightning, flood, pollution, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, 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.
 3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
 4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
 5. allow for partial utilization of the Work by Owner;
 6. include testing and startup; and
 7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued; and
- 7.8. comply with the requirements of Paragraph 5.06.C of the General Conditions.
- B. ~~(Not used) Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.~~

- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until ~~at least 30 days~~ prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.
- D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work. ~~to the extent of any deductible amounts that are identified in the Supplementary Conditions.~~ The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, ~~and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.~~
- E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

5.07 *Waiver of Rights*

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies 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 of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their 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 Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (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 as trustee 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 utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.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, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds* (Not used)

- ~~A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.~~
- ~~B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.~~

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

- A. If ~~either Owner or Contractor~~ has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party Contractor in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party Owner shall so notify the other party Contractor in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. ~~Owner and Contractor~~ shall ~~each~~ provide to the other Owner, such additional information in respect of insurance provided as ~~the other may be~~ reasonably requested. If either party Contractor does not purchase or maintain all of the bonds and insurance required ~~of such party~~ by the Contract Documents, such party Contractor shall notify the other party Owner 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. Without prejudice to any other right or remedy, the other party Owner may

elect to obtain equivalent bonds or insurance to protect ~~such other party's~~Owner's interests at the expense of the ~~party Contractor who was required to provide such coverage~~, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

- A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR’S RESPONSIBILITIES

6.01 *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. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.
- 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.

6.02 *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 regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner’s written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *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.

- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, 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.

D. Provision of any instructions:

- 1. will not be effective to assign to Owner, or any of Owner's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 8.09; and
- 2. will not be effective to assign to Engineer, or any of Engineer's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09.

6.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 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 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.
 - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "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, make or catalogue number, or the name of a particular Supplier, the specification or description 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 or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.

1. *“Or-Equal” Items:* If in Engineer’s sole discretion 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, it may be considered by Engineer as an “or-equal” item, in which case review and approval of the proposed item may, in Engineer’s sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, 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; and
 - 3) it has a proven record of performance and availability of responsive service.
 - 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.
2. *Substitute Items:*
 - a. If in Engineer’s sole discretion an item of material or equipment proposed by Contractor does not qualify as an “or-equal” item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
 - b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.
 - c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.

- d. 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:
 - 1) shall certify that the proposed substitute item will:
 - a) perform adequately the functions and achieve the results called for by the general design,
 - b) be similar in substance to that specified, and
 - c) be suited to the same use as that specified;
 - 2) will state:
 - a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,
 - b) 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
 - c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;
 - 3) will identify:
 - a) all variations of the proposed substitute item from that specified, and
 - b) available engineering, sales, maintenance, repair, and replacement services; and
 - 4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.

B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.

- C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.
- D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- E. *Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. 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.
- F. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.
- B. If the Bidding Requirements or Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and ~~if~~ the Contractor has submitted a list thereof in accordance with the Bidding Requirements or Supplementary Conditions (which shall be included as an attachment to the Agreement), Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. 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 any right of Owner or Engineer to reject defective Work.

- C. 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. 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 moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.
- F. 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.
- G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.
1. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (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 such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.
 2. Such agreement between Contractor and the Subcontractor or Supplier shall specifically include dispute resolution provisions similar to those in Article 16 (if any) and provisions required by Laws and Regulations identified in the various Supplementary Conditions.

6.07 *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.
- D. At the Owner's option, Contractor shall defend claims in connection with any alleged infringement of such rights.

6.08 *Permits*

- A. Unless otherwise provided in the Supplementary Conditions, 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 opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *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 observes that the Specifications or Drawings are at variance with any Laws or Regulations, Contractor shall give Engineer prompt written notice thereof, and any necessary changes will be authorized by one of the methods set forth in Paragraph 3.04. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear 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. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *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, except as may be set forth in the Supplementary Conditions.

6.11 *Use of Site and Other Areas*

- A. Limitation on Use of Site and Other Areas:
 - 1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.
 - 2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. 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 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 by or based upon Contractor's performance of the Work.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other 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 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 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 property to stresses or pressures that will endanger it.

6.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings and other closeout submittals specified will be delivered to Engineer for Owner.

6.13 *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, 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 owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs (if any) and other safety requirements 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 6.13.A.2 or 6.13.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 (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 for protection of the Work 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 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *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.

6.15 *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.

6.16 *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.

6.17 *Shop Drawings and Samples*

- A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.
 - 1. Shop Drawings:
 - a. Submit number of copies specified in the General Requirements.
 - 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 6.17.D.
 - 2. Samples:
 - a. Submit number of Samples specified in the Specifications.
 - b. 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 6.17.D.
- B. 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. Submittal Procedures:
 - 1. Before submitting each Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated each 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 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 and approval of that 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 both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

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 (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
3. Engineer's review and approval 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 6.17.C.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's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1. or for errors or omissions in a Shop Drawing or Sample.

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 in order to obtain required approval of an item with no more than 3 submittals. Engineer will record Engineer's time for reviewing subsequent submittals of Shop Drawings, samples, or other items requiring approval and Contractor shall reimburse Owner for Engineer's charges for such time.
3. In the event that Contractor requests a change of a previously approved item, Contractor shall reimburse Owner for Engineer's charges for its review time unless the need for such change is beyond the control of Contractor.

6.18 *Continuing the Work*

- A. 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, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *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 in accordance with Subcontractor warranties, manufacturers and Suppliers warranties on equipment and material, and extended or special warranties and will not be defective for the correction period specified in 13.07. Owner and Engineer and ~~its~~ their officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.

1. Contractor shall obtain and preserve for the benefit of the Owner:

- a. manufacturers' and Suppliers' written warranties and guarantees on equipment and material incorporated into the Work;
- b. written warranties and guarantees from each Subcontractor engaged in the performance of the Work; and

2. extended or special warranties.

- 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 or the issuance of a notice of acceptability by Engineer;
 6. any inspection, test, or approval by others; ~~or~~
 7. any correction of defective Work by Owner; or-
 8. any acceptance by Owner or any failure to do so.
- D. Contractor shall prepare and execute a written general warranty and guarantee applicable to the Work reflecting the provisions of this Paragraph 6.19, Article 13 and other applicable provisions of the Contract Documents pertaining to warranties and guarantees, Subcontractor, manufacturers and Supplier warranties and guarantees, and extended or special warranties and guarantees. Contractor shall submit this written general warranty and guarantee in accordance with Article 14 and the General Requirements.
- E. Provision of any warranties or guarantees:
1. will not be effective to assign to Owner, or any of Owner's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 8.09; and
 2. will not be effective to assign to Engineer, or any of Engineer's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09.
- F. The warranty and guarantee provisions of this Paragraph 6.19 shall be in addition to and not in limitation of any other warranties, guarantees or remedies allowed by Law or the Contract Documents.

6.20 Indemnification

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify, defend, 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 or wrongful 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 6.20.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. Without limiting the generality of the preceding Paragraph, the Contractor hereby specifically agrees to indemnify, defend, and hold harmless the Owner and Engineer from all such claims, losses or expenses which arise out of injuries of employees of the Contractor or any of its Subcontractors or Suppliers of any tier related to performance of the Work. It is the Owner intention that all financial risk of injuries related to the Work be borne by the Contractor, and that the Owner have no financial responsibility, direct or indirect, for any such claims.
- C. The indemnification obligations of Contractor under Paragraph 6.20.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, provided however, that if the claim, cost, loss or damage referred to in this Paragraph 6.20 results from failure of the Engineer to discover a condition, Underground Facilities or object which is underground or otherwise not reasonably observable by the Engineer, and if said failure to discover either was or should have been apparent to the Contractor in that the said condition or object is omitted from the Engineer's maps, Drawings, opinions, reports, surveys, Change Orders, designs or Specifications, then the Contractor shall be liable for indemnification of the Engineer and Owner under Paragraph 6.20 for claims, costs, losses and damages resulting from said failure to discover unless Contractor shall have notified Engineer of the existence

and location of such condition or object prior to the occurrence of such claims, costs, losses and damages and in sufficient time for Engineer to have made provisions therefor; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage-; or

3. caused by the negligent acts, errors or omissions of any of them.

6.21 *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 law.
- 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, Shop Drawings 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 6.21, 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 6.17.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

- A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to Contractor prior to starting any such other work; and
 2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.
- B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. 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. ~~The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.~~
- C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, 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.

7.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:
1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
 2. the specific matters to be covered by such authority and responsibility will be itemized; and
 3. the extent of such authority and responsibilities will be provided.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.

- B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

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

8.02 *Replacement of Engineer*

- A. In case of termination of the employment of Engineer, Owner shall appoint an engineer ~~to whom Contractor makes no reasonable objection,~~ whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

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

8.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

- A. Owner's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

8.06 *Insurance*

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

- A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *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. However, the Owner shall have the right to direct the Contractor to perform the Work according to any sequence schedule set forth in the Contract Documents or established pursuant thereto. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *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.

8.12 *Compliance with Safety Program*

- 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 pursuant to Paragraph 6.13.D.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *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 Documents.

9.02 *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 9.09. 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. However, the Engineer shall have the right to direct the Contractor to perform the Work according to any sequence schedule set forth in the Contract Documents or established pursuant thereto.

9.03 *Project Representative*

- A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided ~~in~~ the Supplementary Conditions herein, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. 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.
- B. The Resident Project Representative (RPR) will be Engineer's employee or agent at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions. RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall be through or with the full knowledge and approval of Contractor. The RPR shall perform the following.
1. Schedules: Review the Progress Schedule, schedule of Shop Drawing and Samples submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.
 2. Conferences and Meetings: Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences and other Project-related meetings, and prepare and circulate copies of minutes thereof.
 3. Liaison:
 - a. Serve as Engineer's liaison with Contractor, working principally through Contractor's authorized representative, to assist in providing information regarding the intent of the Contract Documents.
 - b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.

- c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.
- 4. Interpretation of Contract Documents: Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.
- 5. Shop Drawings and Samples:
 - a. Record date of receipt of Samples and approved Shop Drawings.
 - b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.
- 6. Modifications:
 - a. Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, to Engineer.
 - b. Transmit to Contractor in writing, decisions as issued by Engineer.
- 7. Review of Work and Rejection of Defective Work:
 - a. Conduct onSite observations of Contractor's Work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Report to Engineer whenever RPR believes that any part of Contractor's Work in progress will not produce a completed Project that conforms generally to the Contract Documents or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of Work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.
- 8. Inspections, Tests, and System Startups:
 - a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.
 - b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.

9. Records:

- a. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of Contractor, Subcontractors, and major Suppliers.
- b. Maintain records for use in preparing Project documentation.

10. Reports:

- a. Furnish periodic reports to Engineer as required of progress of the Work and of Contractor's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.
- b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.
- c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, damage to property by fire or other causes, or the discovery of any Hazardous Environmental Condition or conditions that may impede the compliant operation of existing facilities on Site.

11. Payment Requests: Review Applications for Payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.

12. Certificates, Operation and Maintenance Manuals: During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Specifications to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.

13. Completion:

- a. Participate in a Substantial Completion inspection, assist in the determination of Substantial Completion and the preparation of the Punch List (lists of items to be completed or corrected).
- b. Participate in a final inspection in the company of Engineer, Owner, and Contractor and prepare a final Punch List (list of items to be completed and deficiencies to be remedied).
- c. Observe whether all items on the final Punch List have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the Notice of Acceptability of the Work.

C. The RPR shall not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment, including “or-equal” items.
2. Exceed limitations of Engineer’s authority as set forth in the Contract Documents.
3. Undertake any of the responsibilities of Contractor, Subcontractors, Suppliers, or Contractor’s superintendent.
4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor’s Work unless such advice or directions are specifically required by the Contract Documents.
5. Advise on, issue directions regarding, or assume control over safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
6. Participate in specialized field or laboratory tests or inspections conducted off-Site by others except as specifically authorized by Engineer.
7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.
8. Authorize Owner to occupy the Project in whole or in part or determine operational protocol that may affect the compliant operation of existing facilities.

9.04 *Authorized Variations in Work*

- A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

- A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

- A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.
- B. In connection with 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, see Paragraph 6.21.
- C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.
- D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

- A. 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 Paragraph 10.05.

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

- A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.
- B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.
- D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents 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. However, the Engineer shall have the right to direct the Contractor to perform the Work according to any sequence schedule set forth in the Contract Documents or established pursuant thereto. 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 14.07.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 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

F. Engineer will have no responsibility or authority:

- 1. To order changes in construction which will result in additional costs or which will require extensions of Contract Times;
- 2. To suspend all or any portion of Contractor's operations;
- 3. To terminate all or any portion of the Work;
- 4. To make final acceptance of all or any portion of the Work; and
- 5. To operate or maintain any portion of the Work.

9.10 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *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 by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).
- B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *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 as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

10.03 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:
 - 1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
 - 2. 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; and
 - 3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *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.

10.05 Claims

- A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
- B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than ~~30~~ 14 days) after the start of the event giving rise thereto. Failure to comply with this notice requirement shall constitute a waiver of the Claim. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within ~~60~~ 30 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).
- C. *Engineer's Action:* Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
1. deny the Claim in whole or in part;
 2. approve the Claim; or
 3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.
- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.

F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

G. Contractor shall not have the right to stop performance of the Work pending resolution of a Claim.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

- A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs 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 11.01.B, 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, 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 11.01.

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 all construction equipment and machinery, and the parts thereof whether rented from Contractor or others 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. 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. Small tools and manual equipment (valued less than \$1,000) are not allowable and are considered to be included in overhead.
 - 1) Costs for rental of construction equipment and machinery will be paid at a rate shown for such equipment in current edition of the Rental Rate Blue Book® for construction equipment published by EquipmentWatch® (www.equipmentwatch.com). When Contractor-owned equipment is ordered by Owner or Engineer to be held at standby, equipment rental rates shall be 50% of normal rate. Rental or standby shall not include time that equipment is inoperative because of malfunction or breakdown and shall cease when the use thereof is no longer necessary for the Work. The rental rate, shall be determined as follows.
 - a) For equipment already on the Project: the monthly prorated rental rate by hourly use.
 - b) For equipment not on the Project: most cost effective daily, weekly or monthly rate. 1 month normal use = 176 hours.
 - 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 5.06.D), 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 telegrams, long distance telephone calls, telephone 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 Contractor is required by the Contract Documents to purchase and maintain.

B. *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 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which 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 Paragraphs 11.01.A.

C. *Contractor's Fee:* When all the Work 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 or when a Claim for an 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 12.01.C.

- D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, 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.

11.02 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: (Not used)
- ~~1. Contractor agrees that:~~
- ~~a. 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~~
- ~~b. 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. Owner's Contingency Allowances:
1. Contractor agrees that Owner's a contingency allowance, if any, is for the sole use of Owner to cover ~~un~~estimated anticipated costs for certain items.
- 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 Owner's contingency allowances, and the Contract Price shall be correspondingly adjusted. Contractor shall not receive payment for any unused portion of the contingency allowance.

11.03 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. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- 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. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:~~

- ~~1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly 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 Contractor 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 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. The value of any Work covered by a Change Order or of any Claim for 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, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
 2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
 3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).
- C. *Contractor's Fee:* 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 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be ~~15~~10 percent;
 - b. for costs incurred under Paragraph 11.01.A.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 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of ~~15-10~~ percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor, provided, however, that on any subcontracted work the total maximum fee to be paid by Owner under this subparagraph shall be no greater than 27 percent of the costs incurred by the Subcontractor who actually performs the Work;
- d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
- 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 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions or other cataclysmic phenomenon of nature, acts of war or terrorism, or acts of God (force majeure).
- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, 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 Price or the Contract Times, or both. 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.

- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions or other cataclysmic phenomenon of nature, acts of war or terrorism, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is 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 described in this Paragraph 12.03.C.
- D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or 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) sustained by Contractor on or in connection with any other project or anticipated project.
- E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 Notice of Defects

- A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 Access to Work

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests 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.

13.03 Tests and Inspections

- A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- B. ~~(Not Used) Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:~~
 - ~~1. — for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;~~

- ~~2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C; and~~
- ~~3. as otherwise specifically provided in the Contract Documents.~~

- 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. Except where responsibility for a specific inspection or test is expressly allocated to Owner in the Specifications or by Laws and Regulations, Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.
- E. 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.
- F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense, ~~unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.~~

13.04 Uncovering Work

- A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.
- B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, 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, furnishing all necessary labor, material, and equipment.
- C. If it is found that the uncovered Work is defective, 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 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 Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.

- D. 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, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *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, 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.

13.06 *Correction or Removal of Defective Work*

- A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. 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 removal (including but not limited to all costs of repair or replacement of work of others).
- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *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 land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
1. repair such defective land or areas; or
 2. correct such defective Work; or
 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 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. 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) will be paid by Contractor and may be deducted from amounts otherwise due the Contractor.
- 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, including materials, equipment and supplies or as defined in manufacturers' and Suppliers' warranties (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, 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 and the terms of this Paragraph 13.07 will continue to apply.
- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. 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) 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 pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *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 in accordance with Paragraph 13.06.A, 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, Owner may, after seven days written notice to Contractor, or immediately in the case of an emergency, correct, or remedy any such deficiency.

- B. In exercising the rights and remedies under this Paragraph 13.09, 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, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or 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 (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) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. 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 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

- A. The Schedule of Values established as provided in Paragraph 2.07.A 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.

14.02 *Progress Payments*

- A. 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 or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

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.

B. Review of Applications:

1. Engineer will, within 10 days after receipt of each Application for Payment, 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 9.07, 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 Documents; 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 moneys 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 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
 - d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. Payment Becomes Due:

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor. For the purposes of this Paragraph, "Owner" shall mean "Owner's approving authorities".

D. Reduction in Payment:

1. Owner may refuse to make payment of the full amount recommended by Engineer because:
 - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;

- b. 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 and provides an indemnity satisfactory to Owner for all claims, costs, losses and damages arising out of such Liens;
 - c. there are other items entitling Owner to a set-off against the amount recommended including liability for liquidated damages and correction of defective work by Owner or others; or
 - d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action 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, when Contractor remedies the reasons for such action.
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 14.02.C.1 and subject to interest as provided in the Agreement.

14.03 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use and final testing has been completed in accordance with the General Requirements, Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor in the Punchlist as incomplete) using the Notice of Substantial Completion form included in the Contract Documents, submit the Contractor's written general warranty and guarantee per Paragraph 6.19.D., and request that Engineer issue a certificate of Substantial Completion.
- 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 does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion using the Certificate of Substantial Completion included in the Contract Documents. There shall be attached to the certificate a Punch List (tentative list of items to be

completed or corrected before final payment). Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised Punch List (tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

- D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.
- E. 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 tentative list.

14.05 *Partial Utilization*

- 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. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and 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 14.04.A through D for that part of the Work.
 - 2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and 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 14.04 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 5.10 regarding property insurance.

B. Owner may request in writing that Contractor permit Owner to separately operate any part of the Work although it is not substantially complete subject to the following conditions.

1. A copy of such request will be sent to Engineer and, within a reasonable time thereafter, Owner, Contractor and Engineer shall make an inspection of that part of the Work not substantially complete to determine the status of completion and will prepare a Punch List before final payment.
2. If Contractor does not indicate in writing to Owner and Engineer that such part of the Work is not ready for separate operation by Owner, Engineer will finalize the Punch List and will deliver such list to Owner and Contractor, together with a written recommendation as to the division of responsibilities between Owner and Contractor with respect to security, operation, safety, maintenance, utilities, insurance, warranties and guarantees for that part of the Work pending final payment.
3. The Engineer's recommendation and Punch List will become binding upon Owner and Contractor at the time the Owner takes over and separately operates such part of the Work unless otherwise agreed in writing and so informed Engineer.
4. During such separate operation by Owner and prior to Substantial Completion of such part of the Work, Owner shall allow Contractor reasonable access to complete or correct Punch List and to complete other related Work.

14.06 *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 is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. Application for Payment:

1. After Contractor has, in the opinion of Engineer, 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, warranties, updated Contractor's written general warranty and guarantee per Paragraph 6.19.D if modified, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, and Engineer has indicated that the Work is acceptable (subject to the provisions of Paragraph

14.09). Contractor may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;

b. consent of the surety, if any, to final payment;

c. a list of all Claims against Owner that Contractor believes are unsettled;

e.d. Notice of Completion; and

d.e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) 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.

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 Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. 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 14.09. 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. Payment Becomes Due:

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor. For the purposes of this Paragraph, "Owner" shall mean "Owner's approving authorities".

14.08 *Final Completion Delayed*

- A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted as detailed on the Notice of Completion. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

- A. The making and acceptance of final payment will constitute:
1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
 2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *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 notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will 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 established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
 2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;

3. Contractor's repeated disregard of the authority of Engineer; or
 4. Contractor's violation in any substantial way of any provisions of the Contract Documents;
or-
 5. Contractor commences a voluntary case under any chapter of the Bankruptcy Code (Title 11, United States Code), as now or hereafter in effect, or if Contractor takes any equivalent or similar action by filing a petition or otherwise under any Laws and Regulations in effect at such time relating to the bankruptcy or insolvency; or
 6. a petition is filed against Contractor under any chapter of the Bankruptcy Code as now or hereafter in effect at the time of filing, or if a petition is filed seeking any such equivalent or similar relief against Contractor under any Laws and Regulations in effect at the time relating to bankruptcy or insolvency; or
 7. Contractor makes a general assignment for the benefit of creditors; or
 8. a trustee, receiver, custodian or agent of Contractor is appointed under applicable law or under contract, whose appointment or authority to take charge of property of Contractor is for the purpose of enforcing a Lien against such property or for the purpose of general administration of such property for the benefit of Contractor's creditors; or
 9. Contractor admits in writing its inability to pay its debts generally as they become due.
- B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:
1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);
 2. 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
 3. complete the Work as Owner may deem expedient.
- C. If Owner proceeds as provided in Paragraph 15.02.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 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) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed 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.

- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.
- E. 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. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.
- F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

15.03 *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. ~~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) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and~~
 - 4. reasonable expenses directly attributable to termination.
- B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) 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 15.03.

- 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 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 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 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

- A. Subject to the requirements in Paragraph 10.05, Owner and Contractor shall attempt in good faith to resolve all unsettled Claims, counterclaims, disputes and other matters in question between them arising out of or relating to the Contract Documents ("Disputes") promptly by negotiation, as follows. All negotiations pursuant to this clause are confidential and shall be treated as compromise and settlement negotiations for purposes of the Federal Rules of Evidence and state Rules of Evidence.
1. Either party may give the other party written notice of any Dispute not resolved.
 2. Managers of both parties at levels at least one level above the Project personnel involved in the dispute shall meet at a mutually acceptable time and place within 5 business days after delivery of such notice, and thereafter as often as they reasonably deem necessary, to exchange relevant information and to attempt to resolve the Dispute.
 3. If the matter has not been resolved within 30 days from the referral of the Dispute to the managers, or if no meeting has taken place within 10 days after such referral, either party may initiate mediation as provided hereinafter.
- A.B. Subject to Paragraph 16.01.A, eEither Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.
- B.C. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.
- C.D. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:

1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or
2. agrees with the other party to submit the Claim to another dispute resolution process; or
3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 *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 to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or
 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

- A. When any period of time is referred to in the Contract Documents 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.

17.03 *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 Documents. 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.

17.04 *Survival of Obligations*

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

17.05 *Controlling Law*

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

17.06 *Headings*

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

17.07 *Professional Fees and Court Costs Included*

- A. In any action or proceeding to enforce or interpret any contractual provision or to resolve any conflict or dispute relating to or arising from this Contract, the prevailing party shall be entitled to recover, as part of its claim, award or judgment, reasonable attorneys' fees and associated costs and expenses, including expenses of engineering, claims and other consultants.

END OF SECTION

SECTION 00 73 05

SUPPLEMENTARY CONDITIONS

The following sections modify or supplement the Standard General Conditions of the Construction Contract (“General Conditions”) included in Section 00 72 05 and are in addition to the modifications highlighted within the text thereof. All provisions which are not so modified or supplemented remain in full force and effect. The Supplementary Conditions may include certain provisions required by Laws and Regulations. Contractor is responsible to determine and obtain applicable Laws and Regulations and to review and interpret the full text of such Laws and Regulations.

The terms used in these Supplementary Conditions have the meanings stated in the Standard General Conditions and as may be included within the Sections listed below.

- 00 73 10 Project Specific Requirements
- 00 73 19 Health and Safety Requirements
- 00 73 43 Wage Rate Requirements
- 00 73 46 Wage Determination Schedule
- 00 73 73 Statutory Requirements

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SECTION 00 73 10

PROJECT SPECIFIC REQUIREMENTS

GENERAL

The address system used herein is the same as the address system used in the General Conditions, with the prefix "SC" added thereto. Additional terms used in this Section have the meanings stated below, which are applicable to both the singular and plural thereof.

This Section may include certain provisions required by Laws and Regulations, but does not represent or reflect all applicable provisions and policies or Laws and Regulations, and may only include excerpts and portions thereof. Other required provisions and policies, and Laws and Regulations, shall be deemed to be so included and incorporated herein. Contractor is solely responsible to determine, obtain, review and interpret the full text of applicable provisions and policies, Regulations, and Laws.

SC-1.01.B *Additional Terms:* Add the following new definition.

6. *Installer* -- The entity engaged by Contractor or a Subcontractor for installation, erection, application and similar required operations of a particular portion of the Work at the Site, including who has specialty experience in the Work they are engaged to perform.

Add the following immediately after Paragraph 2.05.B.

- C. Additionally, within 10 days after the Effective Date of the Agreement, Contractor shall submit a Construction Operations Plan incorporating the schedules submitted pursuant to Paragraph 2.05.A and covering the following.
 1. Construction methods and sequence of operations
 2. Proposed Site access
- D. Additionally, within 10 days after the Effective Date of the Agreement, Contractor shall submit a detailed Contractor's Health and Safety Plan (CHASP) for all workers engaged in the work under this Contract.

SC-2.07 *Initial Acceptance of Schedules*

Add the following immediately after subparagraph 2.07.A.4.

5. Contractor's Construction Operations Plan submitted pursuant to Paragraph 2.05.C. will be acceptable to Engineer if it accurately and reasonably addresses all aspects of the Work.

SC-6.02 *Labor; Working Hours*

Pursuant to Paragraph 6.02.B, regular working hours for this Project are 7:00 a.m. to 6:00 p.m., Monday through Friday.

SC-7.01 *Related Work at Site*

Owner has separately contracted for or intends to separately contract for a new hopper (Hopper #3) and compactor, See SC-7.02 for coordination details.

SC-7.02 *Coordination*

Pursuant to Paragraph 7.02.A, for other work on the Project at the Site Owner has separately contracted for or intends to separately contract for, as identified in SC-7.01 above, authority and responsibility for coordination of the other work will be identified at the Preconstruction Conference.

SC-14.02 *Progress Payments*

Add the following at the end of Paragraph 14.02.C.1.

For the purposes of this Paragraph, “Owner” shall mean “Owner’s approving authorities”.

END OF SECTION

SECTION 00 73 19

HEALTH AND SAFETY REQUIREMENTS

Contractor shall comply with the following minimum requirements and is solely responsible to determine, obtain, review and interpret the full text of applicable Laws and Regulations.

- A. Code of Federal Regulations, Chapter XVII-Occupational Safety and Health Administration (OSHA), Department of Labor, Title 29, Part 1926, Safety and Health Regulations for Construction
 - 1. Contractor shall strictly comply with the Hazard Communication Standard 1910.1200 regulated by OSHA, including providing and maintaining Safety Data Sheets, labeling of hazardous substances, and providing required protective equipment and training and instruction to personnel on the Site including Owner and Engineer's personnel.
 - 2. Perform confined space work in accordance with OSHA General Industry 1910.146: Permit Required Confined Space Entry.
- B. ANSI/ASSE A10 series of safety construction standards including the "Manual of Accident Prevention In Construction" published by The Associated General Contractors of America
- C. AASHTO Guide on Occupational Safety on Highway Construction Projects, Subpart N, 1926.550, relating to protection of personnel and equipment under electric lines and construction equipment clearances at overhead electric lines especially during operations using large vehicles

END OF SECTION

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SECTION 00 73 43

WAGE RATE REQUIREMENTS

The content of this Section does not represent or reflect all applicable Laws and Regulations and may only include excerpts and portions of certain Laws and Regulations. Other provisions required by statute shall be deemed to be so included and incorporated herein. Contractor is solely responsible to determine, obtain, review and interpret the full text of applicable Laws and Regulations.

The Project is subject to prevailing wage rates and requirements as determined by the Maine Department of Labor. The Wage Determination Schedules are included in Section 00 73 46.

Obtain the latest Certified Payroll forms from the following website.

http://www.maine.gov/labor/labor_stats/publications/wagerateconst/

END OF SECTION

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SECTION 00 73 46

WAGE DETERMINATION SCHEDULE

The Project is subject to the following wage rates (included in this section) in accordance with the requirements included in Section 00 73 43. In case of discrepancy between Federal wage rates (if any) and state wage rates, the higher wage rates shall apply.

Minimum wage rates as determined by the State of Maine Department of Labor

END OF SECTION

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SECTION 01 11 00

SUMMARY OF WORK

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Project Description
- B. Description of the Work
- C. Work Sequence and Coordination
- D. Special Requirements
- E. Attachments

1.02 PROJECT DESCRIPTION

- A. Upgrades to the City of Rockland's Transfer Station.

1.03 DESCRIPTION OF THE WORK

- A. The Work includes labor, material and equipment, services required for construction, testing, and commissioning of the Project in accordance with the Contract Documents and as more specifically described in the Specifications and Drawings and includes, but is not limited to, the following principal features.
 - 1. Upgrades to the existing Transfer Station including the following:
 - a. Saw-cutting openings in existing operating floor concrete slab and building foundation wall;
 - b. Construction of concrete curbing, safety railings and truck guide rails;
 - c. Infilling existing floor opening with grating;
 - d. Construction of partition screen wall;
 - e. Upgrades to ground floor concrete slab;
 - f. Relocation of one existing hopper (Hopper #2) and compactor; and
 - g. Electrical and lighting upgrades.
- B. Work By Others
 - 1. The following work at the City of Rockland Transfer Station will be performed by the Owner.

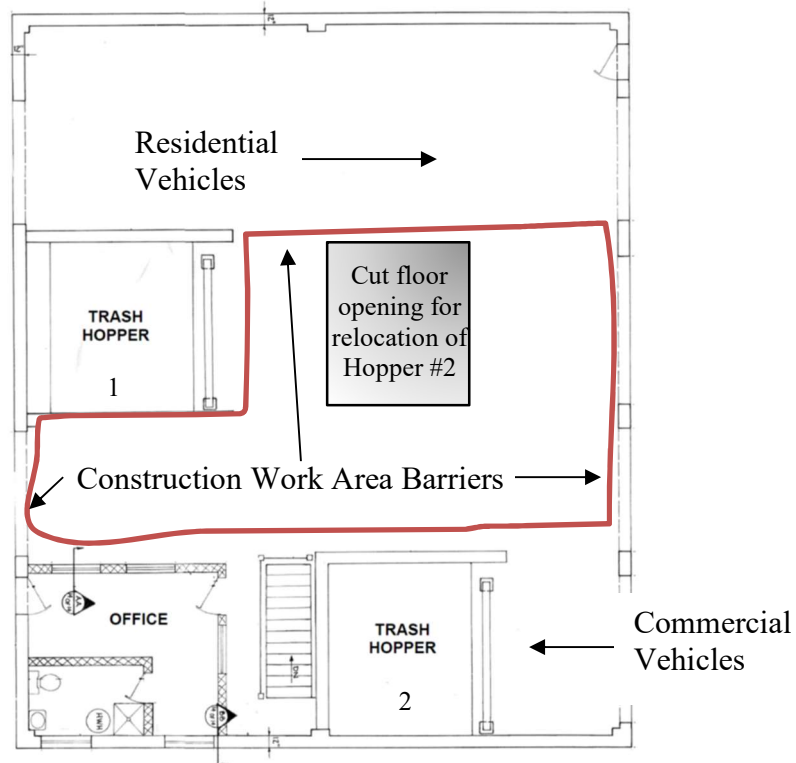
- a. Furnish and install new hopper (Hopper #3) and compactor.
- C. Existing conditions and Site data: per the Drawings and Section 01 15 00.

1.04 WORK SEQUENCE AND COORDINATION

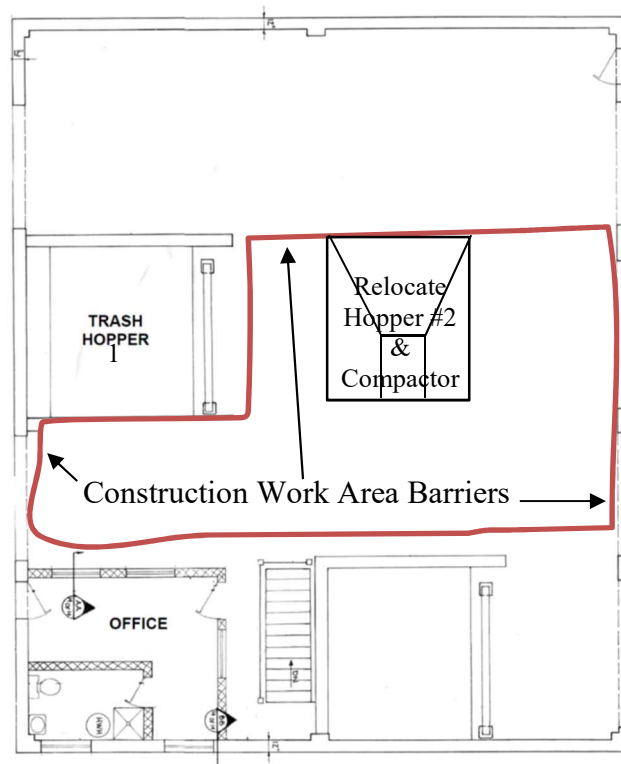
A. Construction Operations Plan

1. Contractor shall prepare a Construction Operations Plan for review and approval by the Owner prior to construction. The Construction Operations Plan shall ensure that all essential areas of the facility remain in service at all times during construction, unless otherwise noted. The Construction Operations Plan shall identify any temporary facility closures required by the Contractor. Contractor is required to segregate public from Construction activities.
 - a. The Transfer Station shall be open to the public on Tuesdays through Saturdays throughout the duration of construction unless a closure is previously approved by the Owner as part of the Construction Sequencing Plan approval. Contractor may request limited closure the facility, up to one additional day per week. Denial of request is not grounds for a claim.
 - b. When the facility is open to the public during construction, the facility must continue to allow the safe disposal of municipal solid waste and recycled materials. Temporary facilities may be provided by the Contractor to safely provide these services during construction.
 - c. Obtain written approval from the Owner and Engineer for any additional closures of the facility not included in the initial Construction Sequencing Plan approval. Notify Owner and Engineer a minimum of two weeks prior to any required additional closures. Denial of request is not grounds for a claim.
2. Maintain access to facilities for the Owner throughout the Project.
3. A preliminary Construction Operations Plan is outline below:

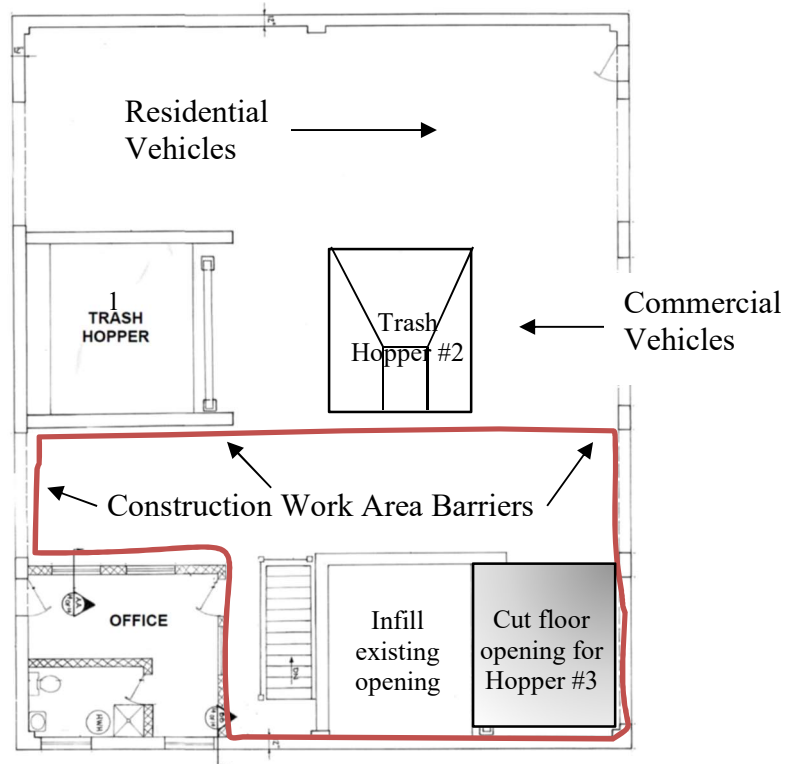
- a. Phase 1: Create opening for relocation of Hopper #2



- b. Phase 2: Relocate Hopper #2 & Compactor – Complete when facility is closed



- c. Phase 3: Create opening for Hopper #3 and infill old Hopper #2 opening



PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 15 00

SPECIFIC PROJECT REQUIREMENTS AND PROCEDURES

The following supplement the requirements and procedures of Sections 01 15 30, 01 50 00, 01 60 00, and 01 70 00 using the same titles, headings, and paragraph numbers to which the supplement applies.

Certain provisions required by Laws and Regulations may be referenced. Contractor is responsible to determine and obtain applicable Laws and Regulations and to review and interpret the full text of such Laws and Regulations.

SECTION 01 15 30 - PAYMENT AND ADMINISTRATIVE PROCEDURES AND QUALITY REQUIREMENTS

1.03 ADMINISTRATIVE REQUIREMENTS

Pursuant to Paragraph A. **Project Management and Coordination; Meetings,**

subparagraph 6. regarding **Preconstruction Conference and Site Mobilization Meeting**, submit the **Construction Sequencing Plan** as outlined in Section 01 11 00 for review prior to the preconstruction conference.

Pursuant to Paragraph C. **Submittal Procedures**, subparagraph 1., address submittals as follows.

Engineer:
Woodard & Curran
41 Hutchins Drive, Portland ME 04102
Attn: Megan McDevitt
Phone: (207) 558-3785
Email: mmcdevitt@woodardcurran.com

SECTION 01 50 00 – TEMPORARY FACILITIES AND CONTROLS

1.02 TEMPORARY CONSTRUCTION FACILITIES

Pursuant to Paragraph F. **Parking**, location to be determined at pre-construction meeting.

Pursuant to Paragraph H. **Staging Area**, location to be determined at pre-construction meeting.

1.04 TEMPORARY CONTROLS

Pursuant to Paragraph F. **Traffic Regulation**,

subparagraph 1. regarding a **plan for traffic control**, submit a **Construction Sequencing Plan** as outlined in Section 01 11 00.

SECTION 01 70 00 - EXECUTION AND CLOSEOUT REQUIREMENTS

1.02 OVERALL EXECUTION REQUIREMENTS

Pursuant to Paragraph A. **Coordination**,

- Coordinate with Owner and Engineer prior to performing any Work that will impact the approved **Construction Sequencing Plan**.

END OF SECTION

SECTION 01 15 30

PAYMENT AND ADMINISTRATIVE PROCEDURES AND QUALITY REQUIREMENTS

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements relating to payment, the process of contract administration, and the methods of communicating, controlling, and assuring quality, and applies to all Specifications and Drawings.

1. In certain Paragraphs, checked items indicate those requirements applicable to the Project.
2. Provisions of this Section may be supplemented in the **Specific Project Requirements and Procedures** or other sections of Division 01.

B. Section Includes

- 1.02 PAYMENT PROCEDURES
 - Schedule of Values
 - Payment Procedures
 - Change Procedures
 - Measurement and Payment Procedures
 - Correlation of Submittals
- 1.03 ADMINISTRATIVE REQUIREMENTS
 - Project Management and Coordination; Meetings
 - Documentation of Progress
 - Submittal Procedures
 - Closeout Procedures
- 1.04 QUALITY REQUIREMENTS
 - Reference Standards and Regulatory Requirements
 - Qualifications
- 1.05 ATTACHMENTS

1.02 PAYMENT PROCEDURES

- A. **Schedule of Values:** in accordance with Article 2 of the Standard General and Supplementary Conditions, if any.

1. Provide sufficient detail to allow for determination of the value of the Work at any degree of completion.

☒ For each line item, identify number and title of Specification section in accordance with the Table of Contents.

☐ See **Specific Project Requirements and Procedures** for additional requirements.

Number of hardcopies: **1**

Submit electronically: ☒ by email ☐ on CD
☐ via digital document exchange system in PDF format

- B. **Payment Procedures:** in accordance with Article 14 of Standard General and Supplementary Conditions, if any.

1. Submit Application for Payment using the form included in the Project Forms section. Utilize latest approved Schedule of Values for listing items in Application for Payment. Provide supporting documentation for items included in the Application for Payment.

Number of hardcopies: **1**

Submit electronically: ☒ by email ☐ on CD
☐ via digital document exchange system in PDF format

2. Payment Period: at intervals stipulated in the Agreement.

3. Submit an updated Progress Schedule with each Application for Payment.

☐ See **Specific Project Requirements and Procedures** for additional requirements.

- C. **Change Procedures:** in accordance with Articles 10 and 12 of Standard General and Supplementary Conditions, if any, utilizing forms included in Section 00 60 00 Project Forms.

Number of hardcopies: 1 of each type of form and accompanying documentation.

Submit electronically: ☒ by email ☐ on CD
☐ via digital document exchange system in PDF format

- ☐ See **Specific Project Requirements and Procedures** for additional requirements.

1. Field Order: as authorized by Paragraph 9.04 of the Standard General and Supplementary Conditions, if any.
2. Change Request: issued by Engineer, Owner or Contractor to request or authorize minor variations and deviations, amendments or supplements to the Contract Documents. Initiate requests for substitute items per Paragraph 6.05 of the Standard General and Supplementary Conditions, if any, using a Change Request.
 - a. Engineer or Owner to include a detailed description of a proposed change with supplementary or revised Drawings and Specifications, including a change in Contract Times related to the change (with a stipulation for any overtime work required) and the period of time during which the requested price (if any) will be considered valid. Prepare and submit an estimate within 15 days.
 - b. Describe the proposed change and its full effect on the Work. Describe the reason for the change and the effect on the Contract Price and Contract Time with full documentation (and a statement describing the effect on Work by separate or other contractors).
3. Work Change Directive: as defined in Paragraph 1.01.A.51 of the Standard General and Supplementary Conditions, if any.
4. Change Order: in accordance with Articles 10 and 12 of the Standard General and Supplementary Conditions, if any.
 - a. *Stipulated Price Change Order*: based on Contractor's maximum price quotation or Contractor's request for a Change Order as approved by Engineer or Owner.

3. Promptly enter changes in Project Record Documents.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Project Management and Coordination; Meetings

1. Contact information for Owner and other entities related to the Project and special coordination requirements and contacts during prosecution of the Work **will be provided at the Preconstruction Conference and Site Mobilization Meeting.**
2. Inform Owner and Engineer of the address for sending official correspondence and the address and telephone number of Contractor's representative who will be project manager and Site superintendent for the Contract.
3. During periods of construction and testing keep Owner and Engineer informed in writing with name, address, and telephone number of Contractor's representative who will be responsible and available outside of normal working hours for emergency repairs and the maintenance of safety devices.
 - ☒ Identify the 24 hour, 7 days per week emergency response telephone or cell phone number that is staffed by a person (not a passive answering machine) or provide that a phone call will be returned within one hour.
4. Identify correspondence, submittals, drawings, data and materials, packing slips or other items associated with this Contract as specified in the **Specific Project Requirements and Procedures.**
5. Coordinate scheduling, submittals, and Work of the various Specifications to effectuate an efficient and orderly sequence for installing interdependent construction elements, with provisions for accommodating items installed later.
6. Preconstruction Conference and Site Mobilization Meeting
 - a. Owner to schedule an initial preconstruction conference in accordance with Paragraph 2.06 of the Standard General and Supplementary Conditions, if any.
 - b. Attendance required by Owner, Contractor, Engineer, Contractor's Superintendent, Project Manager, and Subcontractors as a minimum.

c. Sample Agenda

- Distribute Contract Documents
- Discuss design concepts
- Discuss preliminary Progress Schedule, Schedule of Submittals, Schedule of Values and preliminary cash flow projections.
- Designate personnel representing each party; communication procedures
- Procedures and processing of submittals, substitutions, applications for payments, Change Orders and Contract closeout procedures
- Scheduling
- Use of premises by Owner and Contractor
- Owner's requirements and partial occupancy
- Construction facilities and controls provided by Owner
- Temporary utilities provided by Owner and Contractor
- Survey and Site Layout
- Security and housekeeping procedures
- Schedules
- Procedures for testing
- Procedures for maintaining record documents
- Requirements for start-up
- Inspection and acceptance of equipment put into service during construction period
- Access, laydown and coordination with others

- d. Engineer will record minutes and distribute draft copies promptly after meeting to Owner and Contractor for review, then revise as required and distribute thereafter to meeting participants, with copies to Owner and Contractor, and those affected by decisions made.

7. Progress Meetings

- a. Owner to schedule progress meetings beginning no later than 60 days after the Initial Conference and continue thereafter on a **monthly** basis throughout progress of the Work.
- b. Attendance required by Contractor, Contractor's Superintendent, major Subcontractors and Suppliers, Owner and Engineer as appropriate to agenda topics for each meeting.

- c. Sample Agenda
 - Review minutes of previous meetings – unresolved issues
 - Overall project status
 - Work Completed
 - Anticipated Work
 - Schedule
 - Pay Applications
 - Change Orders
 - Submittals
 - Observations, problems, and decisions
 - General Discussion/Comments
 - Action Items
 - Date and time for next meeting
- d. Engineer will record minutes and distribute draft copies promptly after meeting to Owner and Contractor for review, then revise as required and distribute thereafter to meeting participants, with copies to Owner and Contractor, and those affected by decisions made.

8. Pre-installation Conference and Coordination Meetings

- a. When required, convene a pre-installation conference at Site before commencing certain Work that requires coordination or has special requirements or approval.
- b. Convene coordination meetings as may be generally required.
- c. Attendance required by parties directly affecting, or affected by, Work of the specific Specification section.
 - 1) For pre-installation conference, notify Owner and Engineer 5 days in advance.
 - 2) For coordination meetings, party requesting coordination meeting to notify other party(s).
- d. Review conditions, preparation and procedures, and coordination with related Work.

B. Documentation of Progress

1. Submit preliminary and final Progress Schedules as specified in Paragraphs 2.05 and 2.07 of the Standard General and Supplementary Conditions, if any, or as established in Notice to Proceed.

Number of hardcopies: **1**

Submit electronically: ☒ by email ☐ on CD
☐ via digital document exchange system in PDF format

- a. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.
 - b. Indicate estimated percentage of completion for each item of Work at each submission.
 - c. Indicate dates for fabrication, factory testing, delivery, shipping and field testing, and material and equipment delivery dates, including those furnished by Owner. Coordinate with Schedule of Submittals.
2. Submit revised Progress Schedule on monthly basis and with each Application for Payment, identifying changes since previous version. Coordinate content with Schedule of Values, if any.
 3. Documentation of pre-construction conditions, construction progress, and final conditions:

☒ Not Required for the Project

☐ Construction Photographs: to record Site conditions. Ensure existing conditions of roadway surfaces, curbing, berms, sidewalks, driveways, property bounds, landscaped areas, abutters property and any other items that might be affected by the Work are clearly recorded.

☐ Submit prior to starting construction.

☐ Submit photographs with Payment Application:

☐ monthly during progress of Work.

☐ for final payment to record final condition.

Construction photographs: electronic in PDF or JPG format, minimum 300 dpi quality and a minimum resolution of 6.0 megapixels. Identify photographs with date, time, orientation and Project identification.

Number of copies: [Click here to enter text.](#) on 8-1/2 by 11 sheets.

Submit electronically: ☐ by email ☐ on CD
☐ via digital document exchange system

- ☐ Digital Video Recording: Video record, in color, all areas of the Project Site. Ensure existing conditions of roadway surfaces, curbing, berms, sidewalks, driveways, property bounds, landscaped areas, abutters' property and any other items that might be affected by the Work are clearly recorded.

- ☐ Submit prior to the starting construction.
☐ Submit at completion of construction.

Arrange for video recordings to be conducted by a professional videographer in digital videodisc (DVD) format. Include clear and concise audio descriptions of the existing Project Site conditions.

Submit 1 copy of the first completed video recording to the Engineer for review of visual and audio quality. Re-record any recording furnished which, in the opinion of the Engineer, are poor quality or incomplete at no additional cost to Owner. Submit [Click here to enter text.](#) copies of approved videos.

4. Reports

- a. Submit weekly Safety Reports signed by the Safety Representative.
b. Other reports to be submitted:
☒ None
☐ Specified in **Specific Project Requirements and Procedures**

Number of hardcopies: [Click & enter #.](#)

Submit electronically: ☐ by email ☐ on CD
☐ via digital document exchange system in PDF format

C. **Submittal Procedures**

1. Schedule submittals to expedite the Project and coordinate with schedules required by Paragraph 1.03.B above. Deliver each submittal in the quantity and electronic form indicated to Engineer (with copy to Owner where required) at the addresses specified **at the Preconstruction Conference and Site Mobilization Meeting**. Coordinate submission of related items.
2. Present submittals in a clear and thorough manner, in English and using English units. Provide space for Contractor, Engineer, and Owner's review stamps. Use sheet size of not less than 8 1/2 by 11 inches and not more than 24 by 36 inches.
3. Revise and resubmit documents as required. Identify all changes made since previous submittal. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions. Submittals not requested on the submittal schedule may not be recognized or processed.
4. Submit preliminary and final Schedule of Submittals as specified in Article 2 of the Standard General and Supplementary Conditions, if any, or as established in Notice to Proceed. Include all submittals specified in the Standard General and Supplementary Conditions, if any, General Requirements, and other Specification sections.

Number of hardcopies: **1**

Submit electronically: ☒ by email ☐ on CD
☐ via digital document exchange system in PDF format

- a. Include description of each submittal, date by which each submittal will be delivered to Engineer and Owner date by which each submittal must be approved to maintain project schedule, and relevant section reference.
- b. Allow 10-15 days from receipt of submittal/resubmittal for Engineer review of submittals and possible resubmittal.

5. Shop Drawings and Samples: Submit in accordance with Paragraph 6.17 of the Standard General and Supplementary Conditions, if any, and as follows, and coordinate with the Schedule of Submittals required in subparagraph 4 above.

Number of prints: **1**

Electronic format: ☒ PDF ☐ DWG ☐ DXF
☐ OTHER (as specified in **Specific Project Requirements and Procedures**)

Submit electronically: ☒ by email ☐ on CD
☐ via digital document exchange system

- a. Complete the submittal transmittal form included as an attachment to this Section as is indicated, numbering each submittal consecutively. Assign resubmittals the same transmittal number as the original with a suffix of a sequential letter to indicate the resubmittal (e.g. the first resubmittal of submittal 25 would be number 25A.) Include only those documents previously issued under original transmittal number in resubmittals. Do not combine new submittals with resubmittals.
- b. Attach a transmittal form to each group of Shop Drawings, manufacturer's literature, equipment data and Samples submitted. Use a sufficient number of transmittal forms so that: items on a single transmittal form pertain to the same equipment item, Specification section or element of Work; items on a single transmittal form are either original submittals or the same number resubmittal; and each Sample is listed on a separate transmittal form.
- c. Engineer to complete review in accordance with Paragraph 6.17.D. of the Standard General and Supplementary Conditions, if any.
- d. Submittals which do not have a fully completed transmittal form will be returned along with unreviewed attachments. Returned submittals, even though incomplete, will be counted as a submittal.
- e. Contractor shall reimburse Owner for Engineer's time for resubmittals per Paragraph 6.17.E. of the Standard General and Supplementary Conditions.
- f. Submission of any Shop Drawing or Sample bearing Contractor's and Engineer's approval shall constitute a representation to Owner that the requirements of Paragraph 6.17 of the Standard General and Supplementary Conditions, if any, have been fulfilled.

6. Variations: Identify variations from Contract Documents and material and equipment or system limitations which may be detrimental to successful performance of the completed Work and identify reasons therefor in accordance with subparagraph 6.17.C.3 of the Standard General and Supplementary Conditions, if any.
- a. Clearly identify requests for “Or-Equal” and substitute items and submit per Paragraph 6.05 of Standard General and Supplementary Conditions, if any, and subparagraph 1.02.C.5 above. Substitute items will not be considered when indicated or implied on Shop Drawing or material and equipment data submittals without separate written request, or when acceptance will require revision to the Contract Documents.
7. Manufacturers' Installation Instructions and Certificates: Submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing.

Number of prints: **1**

Electronic format: ☒ PDF ☐ DWG ☐ DXF
☐ OTHER (as specified in **Specific Project Requirements and Procedures**)

Submit electronically: ☒ by email ☐ on CD
☐ via digital document exchange system

- a. Indicate special procedures, perimeter conditions requiring special attention and special environmental criteria required for application or installation.
- b. Submit manufacturers' certificates for recent or previous test results on material or equipment, but they must be acceptable to Engineer and Owner. Indicate material or equipment conforms to or exceeds specified requirements and provide supporting reference date, affidavits, and certifications as appropriate.
- c. Submit test results, data, and reports and certifications to Engineer based on tests performed. Submit test reports and certifications for independent testing services specified.

8. Record Documents and Closeout Submittals: submit in accordance with Paragraph 6.12 of the Standard General and Supplementary Conditions, if any, and Paragraph 1.03.D below.

a. *As-Builts for Material and Equipment*

Number of prints: **1**

Electronic format: ☒ PDF ☐ DWG ☐ DXF
☐ OTHER (as specified in **Specific Project Requirements and Procedures**)

Submit electronically: ☒ by email ☐ on CD
☐ via digital document exchange system

Indicate "As-Supplied" in revision block and sign. Show all changes and revisions to Final Completion per **Execution and Closeout Requirements**.

- b. *Conformed to Construction Record Drawings*: Submit for Engineer's use in preparing final Record Drawings.

Number of prints: **1**

Electronic format: ☒ PDF ☐ DWG ☐ DXF
☐ OTHER (as specified in **Specific Project Requirements and Procedures**)

Submit electronically: ☒ by email ☐ on CD
☐ via digital document exchange system

Indicate "Conformed by Contractor to Construction Records" in revision block and sign. Show all changes and revisions to Final Completion per **Execution and Closeout Requirements**.

- c. *Warranties and Guarantees*: Submit duplicate notarized copies of warranty documents which are executed and transferable from Subcontractors, Suppliers, and manufacturers. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of Warranty Period.

In PDF format: ☐ on CD
☐ via digital document exchange system

☐ Submit Click here to enter text. copies in ring binders with durable plastic covers and table of contents.

d. *Operation and Maintenance Data*

- 1) Submit draft of completed volumes 30 days prior to equipment startup. Revise content of all sets as required prior to final submission.

Number of hardcopies: **2**

Submit electronically: ☒ by email ☐ on CD
☐ via digital document exchange system in PDF format

- 2) Submit final volumes within 10 days after final inspection.

Submit electronically: ☒ by email ☐ on CD
☐ via digital document exchange system in PDF format

- ☒ Submit 1 copies of data in ring binders with durable plastic covers with 8 1/2 by 11 inch text pages. Cover: title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of Project, and subject matter of binder when multiple binders are required.

- a) Subdivide binder contents with permanent page dividers, logically organized as described below with laminated plastic tabs and clearly print the contents. Prepare a Table of Contents for each volume, with material, equipment, or system description identified, in three parts as follows.

Part 1: Directory, listing names, addresses, and telephone numbers of Contractor, Subcontractors, and major equipment Suppliers, and service representative.

Part 2: Operation and maintenance instructions arranged by system and subdivided by Specification section.

For each system, identify names, addresses, and telephone numbers of Subcontractors and Suppliers. Identify the following:

- Significant design criteria
- List of equipment with As-Builts certified “As-Supplied”
- Parts list for each component
- Operating instructions
- Inspection, maintenance and adjustment instructions for equipment and systems
- Lubrication and maintenance schedules
- Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents
- Troubleshooting guides
- Schematic diagrams

Part 3: Material Safety Data Sheets

Part 4: Other Project documents and certificates, including the following:

- Certificates
- Photocopies of warranties

☐ See **Specific Project Requirements and Procedures** for additional requirements.

D. Closeout Procedures

1. Substantial Completion shall have been achieved when the following has been completed and the requirements of Paragraph 14.04 of the Standard General and Supplementary Conditions, if any, have been met.
 - a. Work is complete, systems are successfully operating, and final testing has been successfully completed.

- b. A full inventory of the spare parts and special tools purchased by the Owner are replenished and in the custody of the Owner.
 - c. The Site has been restored to the satisfaction of the Owner.
 - d. An inspection of the Work has been completed by the Engineer and the Owner.
 - e. An updated Punch List is provided.
 - f. The Contractor's written warranty and guarantee has been submitted as required by Paragraph 6.19.D. of the Standard General and Supplementary Conditions, if any.
 - g. A Certificate of Substantial Completion has been provided in accordance with Paragraph 14.04.C. of the Standard General and Supplementary Conditions, if any.
2. The Contractor shall have sole care, custody, and control of the Work until achievement of Substantial Completion. During the period between Substantial Completion and the date for Final Completion, Contractor shall be given access to correct items on the Punch List and achieve Final Completion.
3. The date of achieving Substantial Completion is the date set forth in the Certificate of Substantial Completion that is accepted and signed by the Owner.
4. Final Completion shall have been achieved when the Work is complete, the requirements of Paragraphs 14.06 and 14.07 of the Standard General and Supplementary Conditions, if any, have been met, and when the following is complete.
- a. Substantial Completion has been achieved and liquidated damages for failure to meet Substantial Completion Date have been paid.
 - b. All Work including Punch List Items has been completed.
 - c. Final cleaning has been conducted and Contractor equipment and supplies including waste materials have been removed from the Site and legally disposed of.
 - d. A full set of record documents have been submitted as specified in subparagraph 1.03.C.8 above and Contractor's written warranty and guarantee has been resubmitted if adjusted.
 - e. Inspections required by Laws and Regulations are complete. Certificates and permits to occupy and operate have been issued if required.

- f. Spare parts, maintenance and extra materials have been delivered in quantities specified to Project Site and stored as directed.
- g. A request for final inspection in accordance with Paragraph 14.06 of the Standard General and Supplementary Conditions, if any, has been submitted to the Engineer and the inspection has been completed and the results accepted by the Owner.
- h. A Final Application for Payment has been submitted to the Engineer identifying total adjusted Contract Price, previous payments, and balance due along with required documentation in accordance with Paragraph 14.07.A. of the Standard General and Supplementary Conditions, if any.

1.04 QUALITY REQUIREMENTS

A. Reference Standards and Regulatory Requirements

- 1. Reference to standards, specifications, manuals or codes of any technical society, organization or association, or Laws or Regulations of any governmental authority are used in accordance with Paragraph 3.02 of the Standard General and Supplementary Conditions, if any.
 - 2. Acronyms and abbreviations used are defined in the applicable versions of the Encyclopedia of Associations published by Gale (part of Cengage Learning) generally available in large libraries and on the internet.
- ☐ See **Specific Project Requirements and Procedures** for additional requirements.

B. Qualifications

- 1. Meet or provide capability to meet the criteria specified in individual Specification sections in connection with various portions of the Work of the Contract Documents .
- 2. As a minimum, Contractor shall:
 - a. have been regularly and actively engaged in similar Work as described in the Contract Documents, operating under the same business name and business organization structure, for the last 5 years on at least 5 projects;
 - b. have successfully completed at least 3 projects involving construction of similar facilities in the same state as the Project covered by the Contract Documents;

- c. have a full-time project manager in responsible charge of the Work with at least 10 years' experience as project manager on comparable projects; and
 - d. carry at least the insurance coverage and amounts required in Article 5 of the Standard General and Supplementary Conditions, if any.
- ☐ See **Specific Project Requirements and Procedures** for additional requirements.

1.05 ATTACHMENTS

- A. Transmittal form

END OF SECTION

TRANSMITTAL FORM

[illegible]

☐ The material and equipment, and requirements for construction/installation contained in Submittal No. (s) _____ have been reviewed and we certify that they are correct and in strict conformance with the requirements specified (no exceptions or deviations)

☐ The material and equipment and requirements for construction/installation contained in Submittal No. (s) _____ have been reviewed and we certify that they are correct and in strict conformance with the requirements specified except for the following deviations (list below or attach listing):

CONTRACTOR'S NAME _____

ADDRESS _____

BY: _____ DATE: _____

This page intentionally left blank

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.01 SUMMARY

- A.** This Section specifies temporary facilities and controls for execution of the Work put into place for use only during the period of construction, that will be removed when no longer required for construction operations, and applies to all Specifications and Drawings.

1. In certain paragraphs, checked items indicate requirements applicable to the Project.
2. Provisions of this Section may be supplemented in the **Specific Project Requirements and Procedures** or other sections of Division 01.

B. Section Includes

1.02 TEMPORARY CONSTRUCTION FACILITIES

Barriers
Protection of Work
Security
Safety Facilities
Access Roads
Parking
Field Offices
Staging Area
Project Identification
Progress Cleaning and Waste Removal

1.03 TEMPORARY UTILITIES

1.04 TEMPORARY CONTROLS

Dust Control
Water Control and Dewatering
Erosion and Sediment Control
Noise Control
Pollution Control
Traffic Regulation

1.05 REMOVAL OF TEMPORARY UTILITIES, FACILITIES, AND CONTROLS

1.02 TEMPORARY CONSTRUCTION FACILITIES

A. Barriers

1. Comply with the requirements of Paragraph 6.11. of the Standard General Conditions and Supplementary Conditions, if any.
2. Furnish barriers to prevent unauthorized entry to and clear delineation of construction areas, to allow for Owner's use of Site, and to protect existing facilities and adjacent properties from damage from construction operations as recommended by OSHA and as otherwise required for the protection of life and property during construction.
3. Construct barricades and protective facilities in accordance with local and state regulations. Furnish and install signs, lights, reflectors, and such protection facilities as may be required.
4. Furnish barricades required by governing authorities for public rights of way.
5. Provide protection for plant life designated to remain. Replace damaged plant life.
6. Protect non owned vehicular traffic, stored materials, Site and structures from damage.
7. If required, furnish commercial grade, minimum 8 foot high chain link fence around construction Site. Equip with vehicular gates with locks.

B. Protection of Work

1. Protect Work during working and non-working hours.
2. Provide special protection where specified in Specifications or Drawings and in accordance with manufacturer recommendations.
3. Furnish temporary and removable protection for installed equipment and material. Control activity in immediate Work area to minimize damage.
4. Protect exterior areas of Work from damage. Prohibit traffic from landscaped areas.

5. Buildings and Enclosures
 - a. Furnish protective coverings at walls, projections, jambs, sills, and soffits of openings and protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
 - b. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
6. Whenever gale or high winds are forecast, take measures to secure loose material, equipment or other items that could be blown and be damaged or cause damage. Do not leave such loose items unsecured at end of a working day. Particular attention shall be taken with scaffolding and items placed or stored on roofs or within a structure prior to being enclosed.
7. Provide for removal of snow and ice which may impede Work, damage the finishes or materials, be detrimental to workers, or impede trucking, delivery, or moving of materials at the Site, or prevent adequate drainage of the Site or adjoining areas.

C. Security

1. Provide protection to stored items, the Work and Owner's operations from unauthorized entry, vandalism, or theft, and against fire, storms and other losses during working and non-working hours.
2. Coordinate with Owner's security program.

D. Safety Facilities

1. Provide first aid and other safety facilities required by Laws and Regulations during working and non-working hours.

E. Access Roads

1. Construct and maintain temporary roads accessing public thoroughfares to serve construction area. Control dust and water.
2. Extend and relocate as Work progress requires. Provide detours necessary for unimpeded traffic flow.
3. Provide for emergency access and maintain throughout the Work Site.

F. Parking

1. Do not allow construction vehicle parking on existing pavement or sidewalks.
 - ☐ Available parking areas at the Project Site are identified on the Drawings
 - ☐ Off-Site construction parking area to be established at a location determined by Contractor.

G. Field Offices

- ☒ Delete - not required for the Project.
 - ☐ Provide for the Project as follows.
1. Furnish weather tight office with lighting, electrical outlets, heating, cooling and ventilating equipment, and equip with furnishings and accessories to accommodate supervision of Work, maintenance of records, and project meetings, including, but not limited to the following.
 - ☐ Also furnish separate office space within field office for use by Engineer and Resident Project Representative with a door sign on them main entrance displaying the Woodard & Curran logo, minimum 8.5 inches by 11 inches, fade resistant with magnetic backing, and similarly equipped with fully functional equipment and furniture.
 - Desk and chairs (2 cushioned office desk chairs and 4 metal fold chairs)
 - Plan table with light and stool
 - 3 locking file cabinets
 - Hanging plan rack
 - Book case with 4 shelves
 - “All-in-one” color copier, printer, scanner and fax machine, capable of 11 by 17 output (OR separate color copier, color printer, color scanner, all capable of 11 by 17 output, and fax machine)
 - Paper stock for duration of Project
 - Telephone with answering machine (or telephone service with voicemail feature)
 - Refrigerator, microwave, and water cooler with bottled water supply for duration of Project
 - First aid kit
 2. Maintain utilities per Article 1.03 below for the duration of the Project.

3. Location of Field Offices

- ☐ Locate as shown on the Drawings.
- ☐ Locate as specified in the **Specific Project Requirements and Procedures.**

H. Staging Area

- ☐ Locate as shown on the Drawings.
- ☒ Locate as specified in the **Specific Project Requirements and Procedures.**
- ☐ Owner is not providing a location for staging area. Determine and secure a location for staging area.

I. Project Identification

- ☒ Delete - not required for the Project.
- ☐ Provide for the Project
 - ☐ as specified in the **Specific Project Requirements and Procedures.**
 - ☐ as shown on the Drawings.

J. Progress Cleaning and Waste Removal

1. Comply with the requirements of Paragraph 6.11. B and C of the Standard General Conditions and Supplementary Conditions, if any.
2. Maintain areas free of waste materials, debris, and rubbish and maintain the Site in a clean and orderly condition.
3. Remove debris and rubbish from spaces and other closed or remote spaces before enclosing the space.
4. Collect and remove waste materials, debris, and rubbish from Site at least weekly and legally dispose off-Site.

1.03 TEMPORARY UTILITIES

A. Power service

- ☒ Delete - not required for the Project.
- ☐ Provide for the Project as follows.
 1. Arrange for and pay for required power service from local electric utility for duration of Project. Exercise measures to conserve energy. Furnish and install required equipment including pole of sufficient height to provide proper clearance and install weatherproof box of such size to house service disconnect, overcurrent protection, electric meter, and other required equipment.
 - ☐ Locate as shown on the Drawings.
 - ☐ Locate as designated by Owner.
- ☐ See the **Specific Project Requirements and Procedures** for additional requirements.

B. Telephone service and internet access to field offices

- ☒ Delete - not required for the Project.
- ☐ Provide for the Project as follows.
 1. Arrange for, pay for, and maintain telephone service and internet access to field offices at time of Project mobilization and for duration of Project.
 2. Obtain voicemail feature if answering machine not provided.
 3. Provide wireless, high speed broadband internet access via DSL, cable, satellite, or T1.
- ☐ See the **Specific Project Requirements and Procedures** for additional requirements.

C. Water service

- ☒ Delete - not required for the Project.
- ☐ Provide for the Project as follows.
 - 1. Arrange for, pay for and maintain suitable quality water service as required for duration of Project.
 - ☐ Owner will provide water at no charge for construction.
 - ☐ See the **Specific Project Requirements and Procedures** for additional requirements.

D. Furnish and maintain required sanitary facilities and enclosures. Do not use existing facilities.

E. Furnish lighting for construction operations. Furnish lighting for exterior staging and storage areas and for security purposes. Maintain lighting and provide routine repairs.

F. Furnish heat devices and heat and cooling devices as required to maintain specified conditions for construction operations.

G. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

H. Fire Protection

- 1. Provide temporary fire protection equipment and services during construction per NFPA and local fire code and regulations, and fire marshal's requirements.
- 2. Use Work procedures that minimize fire hazards to the extent practicable and materials that are fire resistant where possible. Collect and remove combustible debris and waste materials from the Site each day. Store fuels, solvents, and other volatile or flammable materials away from the construction and storage areas in well-marked, safe containers in accordance with Laws and Regulations.

1.04 TEMPORARY CONTROLS

- A. **Dust Control:** Execute Work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere. Utilize the application of sprinkled water to reduce the emission of air-borne soil particulates from the Project Site.

B. **Water Control and Dewatering**

- ☒ Delete - not required for the Project.
- ☐ Provide for the Project as follows.
- ☐ See the **Specific Project Requirements and Procedures** for additional requirements.

Grade Site to drain away from excavations to approved drainage collection facilities. Ensure collected surface drainage water meets permitted criteria for sediment content prior to discharge.

1. Maintain excavations free of water. Furnish, operate and maintain pumping equipment.
2. Dewater excavations and legally dispose of water in a manner that will not cause injury to public and private property.
3. Protect Site from puddling, ponding or running water.
4. Design, furnish, install, maintain, operate and remove temporary dewatering systems as required to lower and control water levels and hydrostatic pressures in excavations during construction; legally dispose of pumped water; construct, maintain, observe and, except where indicated or required to remain in place, remove dewatering equipment and system at the completion of construction.
 - a. Dewatering may include: lowering the water table, intercepting and collecting seepage which may penetrate the support of excavation, slopes or bottom of the excavation; increasing the stability of excavated slopes; preventing loss of material from beneath the slopes or bottom of the excavation; reducing lateral loads on sheeting and bracing; limiting horizontal displacements and stresses in support of excavation to tolerable and allowable levels; preventing displacements of existing structures, utilities, pavements, and sidewalks; improving the excavation and hauling characteristics of sandy soil; preventing rupture or heaving of the bottom of any excavation; and disposing of pumped water.

- b. *Normal dewatering* is defined as using conventional pumps installed in open excavations, ditches, or sumps to control water and allow for installation of the pipe in a dry trench.
- c. *Special dewatering* is defined as installing wellpoints, deep wells, or eductor and ejector systems to control groundwater and hydrostatic pressures to allow for installation of the work. Special dewatering includes design of the dewatering system by a Professional Engineer currently registered in the state where the Project is located in good standing, and conducting additional borings or subsurface explorations deemed necessary by the Contractor, and approved by the Engineer, to support design.
 - 1) For Special Dewatering, retain the services of a Professional Engineer currently registered in the state where the Project is located in good standing, experienced in design of dewatering systems, to independently evaluate the boring logs and other soils information available to determine those areas that will require special dewatering techniques and to design the required system. If, in the opinion of the Contractor or Contractor's Dewatering Professional Engineer, additional borings are needed to design special dewatering systems or determine areas where special dewatering techniques will be required, the Contractor shall retain and pay for the services of a boring subcontractor. Contractor's Dewatering Professional Engineer shall provide sufficient on-Site inspection and supervision to assure that the dewatering is carried out in accordance with the approved design.
- d. Design a dewatering system capable of:
 - 1) effectively reducing the hydrostatic pressure and lowering the groundwater levels to a minimum of 2 feet below excavation subgrade in the existing fills and any organic peat, and below the excavation subgrade in the existing organic silts/clays unless otherwise directed by the Engineer, so that all excavation bottoms are firm and dry;
 - 2) maintaining a dry and stable subgrade until the structures, pipes, appurtenances, and drainage pipe and structure bedding to be built therein have been completed to the extent that structures, pipes, and appurtenances will not be floated or otherwise damaged;

- 3) lowering of the groundwater level within the work area without adversely affecting existing structures, utilities, pavements, sidewalks or wells outside of the Work area.
- e. Submit the following.
 - 1) Plans and description of the Normal and/or Special Dewatering systems, including the number, location and depth of wells, wellpoints or sumps; designs of filters to prevent pumping of fine soil; method and location for filtering, sedimentation tanks and legal disposal of pumped water; and flow capacity of proposed system, accounting for groundwater level relative to tide cycles if applicable
 - 2) Design calculations, description and complete layout drawings, stamped and signed by Contractor's Dewatering Professional Engineer, at least two weeks prior to scheduled installation of Special Dewatering system
 - 3) Locations of observation wells
 - 4) Records of pump operation and groundwater elevations
5. Dewatering Operations and Procedures
 - a. Provide electrically operated dewatering equipment, powered with dedicated generators adequately sized to operate the dewatering system and capable of running on commercial power. Provide standby equipment independent of commercial power and provide for dewatering within 24 hours upon primary pump or power failure. No work shall be performed by the Contractor below the pre-construction groundwater level during dewatering system failure.
 - b. Provide suitable temporary pipes, flumes or channels for water that may flow along or across the Site of the Work.
 - c. Provide dewatering equipment with noise attenuation systems capable of meeting the governing noise regulation requirements.
 - d. Encapsulate the suction end of the pump with crushed stone, filter fabric, and other materials to minimize the amount of silt discharged to the amount allowed by the construction dewatering permit.
 - e. Do not operate equipment on paved surfaces to prevent damaging these surfaces.

- f. Locate dewatering facilities to prevent interference with utilities and construction work to be done by others.
 - g. For dewatering operations with relatively minor flows, direct pump discharges using filtration bag or system per Erosion and Sediment Control below, or pump into hay bale sedimentation traps lined with filter fabric. Filter water through the hay bales and filter fabric prior to seepage into storm drainage or any natural water course.
 - h. For dewatering operations with larger flows, provide pump discharges into a steel dewatering/sedimentation basin. Use steel baffle plates to slow water velocities, to increase the contact time, and allow adequate settlement of sediment prior to discharge into waterways, storm drainage or discharge point allowed by the construction dewatering permit.
 - i. Utilize silt sacks in catch basins when excess silt is suspended in the discharge water per Erosion and Sediment Control below.
 - j. If siltation basin is used, size to effectively filter for the volume and discharge rate of water anticipated without overflow.
 - k. Provide treatment necessary to prevent discharge of silty and/or contaminated ground water caused by the Contractor's operations, or any contaminated ground water that may pass from excavated surfaces and/or through the excavation support system selected by the Contractor.
 - l. Dispose of water pumped or drained from the Work in accordance with permit requirements and in a manner to prevent undue interference with other work or damage to adjacent properties, pavements and other surfaces, buildings, structures and utilities.
 - m. Obtain necessary regulatory approvals for the disposal of dewatering flows, including, among others, approval by the Environmental Protection Agency under the National Pollutant Discharge Elimination System (NPDES) program for construction dewatering activities. Submit the completed and approved construction dewatering permit to the Engineer immediately upon receipt.
6. Special Dewatering
- a. Use Special Dewatering as necessary if Normal Dewatering methods are inadequate to ensure dry and stable excavation subgrade conditions.

- b. Special Dewatering techniques may consist of one- or two-stage wellpoint systems, deep wells, or eductor and ejector type systems. Design with suitable screens to prevent pumping of fines and to address specified Work Site conditions.
- c. In areas requiring special dewatering, lower the groundwater level to a minimum of 2 feet below the existing fill and/or organic peat subgrades or to the excavation subgrade for organic silt/clay subgrades prior to any installation and maintain that groundwater level until the excavation has been backfilled and provide monitoring by Contractor's Dewatering Professional Engineer to ensure conformance with the requirements herein.
- d. Furnish materials and install at least two observation wells at each excavation area. The location of the wells shall be proposed in the field by the Contractor's Dewatering Professional Engineer and reviewed and approved by the Engineer.

C. Erosion and Sediment Control

- ☒ Delete - not required for the Project.
- ☐ Provide for the Project as follows.
- ☐ See the **Specific Project Requirements and Procedures** for additional requirements.
- 1. Plan and execute construction using methods to control surface drainage from cuts and fills, from borrow and waste disposal areas and prevent erosion and sedimentation.
- 2. Submit erosion and sediment control plan to Engineer prior to the start of construction.
- 3. Install erosion and sediment controls as may be shown on the Drawings and as required by Laws and Regulations. Install additional erosion and sedimentation control measures beyond those shown on the Drawings as necessary to stabilize the Site. Coordinate temporary erosion controls with permanent erosion controls to the extent practical. Provide and maintain devices to control erosion, siltation, and sedimentation that occur during construction operations. Undertake reasonable precautions and measures to avoid erosion of soil and to prevent silting of drainage ditches, storm sewers, rivers, streams, and lakes.

4. Employ pollution prevention measures, erosion and sedimentation control before, during, and after soils are exposed. Implement measures prior to soil disturbance or soil storage to the extent possible to ensure that such measures are in place before activity occurs and employ additional measures as the Work progresses. Implement and maintain as necessary until the Site is permanently stabilized.
5. Perform inspections of disturbed soil areas, material storage areas exposed to precipitation, and erosion control measures with Engineer a minimum of once every 14 days and also within 24 hours after any storm event greater than 0.5-inches of rainfall. Immediately correct deficiencies in the erosion control measures identified or indicated by failures or erosion by implementing additional measures or different techniques to correct and prevent subsequent erosion at no additional cost to Owner.
6. In the event that silt or debris breaches erosion control, immediately remove and clean silt or debris from drainage ditches and storm sewers and revise erosion control measures as required by the Conservation Commission or the Engineer. Should silt or debris breach erosion controls and reach rivers, streams or lakes, immediately notify local, state or Federal representatives as required and implement required remediation methods at no additional cost to Owner.
7. Limit duration of the exposure of soils on embankments, excavations, and graded areas to a minimum.
8. Provide temporary measures such as berms, dikes and drains to prevent water flow. Install erosion control measures in any ditch, swale or channel before water is allowed to flow in the waterway. Handle water pumped from trenches to minimize discharge of silty water to the maximum extent practicable.
9. Stabilize storm drain outfalls as shown on the Drawings before the discharge points become operational. Install inlet protection immediately upon construction of culverts.
10. Stabilize disturbed areas with temporary and permanent erosion control practices as soon as practicable, but no more than 14 days after construction activity on a particular portion of the Site has temporarily or permanently ceased. Exceptions to this time requirement include: a) where construction activities will resume on the particular portion of the Site within 21 days; and b) where snow cover delays initiation of stabilization measures.

11. Place stockpiled topsoil on the Site away from natural drainages, in piles with side slopes of 50 percent to 70 percent. Install siltation fence around the base of the pile to prevent eroding soil from washing into drainages. Cover topsoil piles which are to remain for a period of 21 days or more with temporary seed and mulch immediately following stockpiling.
12. Conduct pavement sweeping to remove sediment and soil debris accumulation on pavement resulting from construction activity
13. Siltation/Silt Fence
 - a. Filter fabric: suitable for erosion control.
 - b. Wood posts: oak, 2 inches by 2 inches in section, and at least 4.5 feet in length.
 - c. Erosion control fencing: heavy-duty filter fabric towed into the existing soil as shown on the Drawings.
 - d. Construct as shown on Drawings or as directed by Engineer. Install parallel to contours where possible, prior to Site clearing and grading activities.
 - 1) Dig a 6 inch by 6 inch minimum trench where the fence is to be installed. Position the fence in the trench with the fence posts set at 8 feet on center (maximum). Curve ends of fence uphill to prevent flow around ends.
 - 2) Staple sedimentation control fabric and the industrial netting to each post. When joints are necessary, splice filter fabric together only at support posts with 6-inch overlap and securely seal.
 - 3) Bury lower edge of fabric at least 6 inches below ground surface to prevent underflow. Backfill trench and compact soil over filter fabric.
 - 4) Installed height: minimum 2.5 feet and 36 inches maximum.
 - 5) Inspect frequently; repair or replace any damaged sections.
14. Temporary Erosion Control Matting
 - a. Rolled matting blanket consisting of curled wood excelsior, coconut fiber, straw or paper bound with a weave of twisted craft paper, cotton cord or plastic mesh.

- b. Provide staples for fastening matting to the ground. Staples: fabricated in a "U" shape from 11 gage or heavier stiff steel wire, 6 to 12 inches in length and 1 to 2 inches across.
- c. Surface Preparation and Installation
 - 1) Conform to grades and cross sections for slopes and ditches shown on the Drawings. Finish to a smooth and even condition with all debris, roots, stones, and lumps raked out and removed. Loosen soil surface to permit bedding of the matting.
 - 2) Unless otherwise directed, apply seed prior to placement. When directed, spread additional seed over matting, particularly at those locations disturbed by building slots. Press matting onto the ground with a light lawn roller or by other similar means.
 - 3) Bury edges of matting around the edges of catch basins and other structures.

15. Seeding

- a. Select seed variety and applied rates based upon the date of application per the following table. Equivalent seed mixture based on suitability for use in controlling erosion of the various soil types and slopes may be used as approved by the Engineer.

Dates	Seed	Applied Rate (pounds per 1,000 feet ²)
4/1 to 7/1 8/15 to 9/15	Oats	1.8
4/1 to 7/1	Annual Ryegrass	0.9
5/15 to 8/15	Sundangrass	0.9
9/15 to 10/15	Winter Ryegrass	2.6

- 1) Sow seed at the rates indicated, on the pure live seed basis.
- 2) Mulch areas where temporary seeding has been applied. Do not mulch seeded areas where matting will be immediately installed. If temporary seeding does not achieve adequate growth by November 1, apply an additional layer of mulch.
- 3) Mulch temporarily or permanently seeded areas, areas which cannot be seeded within the recommended seeding dates, and any soil stockpile areas, immediately following seeding. Straw or hay mulch, wood fiber mulch, and hydromulch are recommended.

16. Sod: grown from certified seed of adapted varieties to produce high quality sod free of any serious thatch, weeds, insects, diseases and other pest problem, be at least one year old and not older than three years, and cut with a 1/2 inch to 1 inch layer of soil.
- Lay sod strips on the prepared soil, perpendicular to the slope or direction of water flow, starting at the lowest elevation. Butt the edges and ends of the sod strips together and tamp or roll. Stagger joints.
 - Staple sod strips at ends and at 3-foot intervals along the center of the strip.
 - Irrigate sodded area immediately after installation.

17. Catch Basin Silt Sacks

- Style: Silt Sack Regular Flow.
- Test Method: ASTM D-4884 165.0 lbs./inch.
- Silt sack seams: certified average wide width strength.
- Meet the following ASTM D-4884 standards. Properties are Minimum Average Roll Values (MARV).

Property	Test Method	Units	Test Results
Grab Tensile	ASTM D-4632	lbs.	315x300
Grab Elongation	ASTM D-4632	%	15x15
Puncture	ASTM D-4833	lbs.	125
Mullen Burst	ASTM D-3786	psi	650
Trapezoid Tear	ASTM D-4533	lbs	120x150
UV Resistance	ASTM D-4355	%	90
Apparent Opening	ASTM D-4751	US Sieve	40
Flow Rate	ASTM D-4491	gal/min/ft ²	40
Permittivity	ASTM D-4491	sec -1	0.55

- Utilize silt sacks in catch basins as required when excess silt is suspended in discharge water.

18. Filtration Bag or System for Discharge from Excavation Dewatering

- Meet the following standards. Properties are Minimum Average Roll Values (MARV).

Property	Test Method	Units	Test Results
Flow Rate	ASTM D-4491	gal/min/ft ²	40
Permittivity	ASTM D-4491	sec -1	0.55

- b. For discharge from excavation dewatering, install filtration bag or system or dewatering siltation basin constructed of a hay bale barrier lined with filter fabric sized to handle the volume of dewatering without overflowing.
- 19. Compost Filter Socks
 - a. Furnish and install biodegradable mesh “socks” filled with mature, clean compost per EPA National Pollutant Discharge Elimination System (NPDES) specifications.
 - 1) Install per EPA and manufacturers recommendations.
 - 2) Install parallel to contours where possible. Stake socks as needed to stabilize. Inspect frequently and repair as necessary.
- 20. Provide detention basins or water filtration systems for dewatering and coordinate locations with Engineer. See Dewatering in Paragraph B. above.
- 21. Other Temporary Measures
 - a. Provide and maintain temporary slope drains as required.
 - b. Employ other temporary erosion control measures as directed by the Engineer or local Conservation Commission.
- 22. Maintenance
 - a. Inspect erosion control practices immediately after each rainfall and at least daily during prolonged rainfall or snowmelt for damage. Make appropriate repairs or replacement until Final Completion at no additional cost to the Owner.
 - b. Remove silt from siltation fence and/or haybale when it has reached one-quarter of the bale and/or fence height, or prior to expected heavy runoff or siltation.
 - c. Repair matting if any staples become loosened or raised, or if any matting becomes loose, torn, or undermined, make satisfactory repairs immediately.
 - d. Maintain areas mulched or matted until Final Completion, at no additional cost to the Owner.
 - e. Maintain sediment basins by removing silt that reaches a depth of over one foot, at no additional cost to the Owner, until Final Completion.

23. Removal of Temporary Erosion Control

- a. Remove temporary materials and devices upon completion of the Work when permanent soil stabilization has been achieved. Re-use materials in good condition if approved by Engineer.
 - 1) If silt socks are used, remove in paved areas or cut open and disperse media in unpaved areas.
- b. Level and grade to preconstruction conditions and to the extent required to prevent any obstruction of the flow of water or any other interference with the operation of or access to the permanent works.
- c. Remove siltation fences only when adequate grass growth has been established.
- d. Repair areas damaged by silt fences and hay bales to preconstruction conditions to the satisfaction of the local Conservation Commission and the Engineer.
- e. Remove unsuitable materials from Site and dispose of in a lawful manner.

D. Noise Control

- 1. Provide methods, means, and facilities to minimize noise from construction operations.
- 2. Provide noise attenuation systems capable of meeting the federal and state Department of Environmental Protection Air Quality Control Regulations.
- 3. Construct sound enclosures or utilize other noise reduction techniques if the equipment does not meet the noise level requirements.

E. Pollution Control

- ☐ Delete - not required for the Project.
- ☒ Provide for the Project as follows.
- ☐ See the **Specific Project Requirements and Procedures** for additional requirements.

1. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.
 - a. Water Pollution Control
 - 1) Assure that sediment, debris, petroleum, chemicals, or other contaminants will not enter existing drainage facilities and channels. Use construction methods that will prevent entrance of pollutants and wastes into existing streams, rivers, lakes, and flowing and dry watercourses.
 - 2) Obtain legal disposal sites and dispose of pollutants and wastes in a legal manner.
 - 3) Respond immediately to emergencies as directed when water quality of existing streams, rivers, lakes and flowing and dry watercourses is threatened. Take corrective action to remove or contain pollutants until a permanent solution is determined.
 - b. Air Pollution Control
 - 1) Equipment and vehicles that exhibit excessive exhaust emissions due to poor engine adjustments or inefficient operation will not be permitted to operate until corrective repairs or adjustments are made.
 - 2) Burning of materials from clearing or grubbing operations, combustible construction materials, and rubbish will not be allowed.

F. Traffic Regulation

- ☐ Delete - not required for the Project.
- ☒ See the **Specific Project Requirements and Procedures** for additional requirements.
- ☐ Provide for the Project as follows.

1. Control and maintain traffic within the Project area.
 - ☐ Submit traffic control plans and coordinate with Owner and local agencies. Submit plan for traffic control to Owner for review 14 days in advance of any Work within public right-of-way, street closure or detour.
 - ☐ A traffic control plan is not required for the Project.
2. Provide and maintain traffic control and maintenance devices in accordance with Part 6, Temporary Traffic Control, of the "*Manual on Uniform Traffic Control Devices for Streets and Highways*", published by the U.S. Department of Transportation, Federal Highway Administration and other applicable codes and standards as specified. Operate devices 24 hours per day as required.
3. Provide for access by emergency vehicles, such as police, fire, and disaster units at all times. Contractor shall be liable for damages resulting from failure to provide such access.
4. During construction hours, traffic flow must be controlled by uniformed traffic police officers or other traffic controllers allowed by Laws and Regulations. The services of traffic controllers shall in no way relieve the Contractor of its responsibilities under the Contract.
5. Maintain minimum of one moving lane on roadways at all times.
 - a. Where detours are permitted, provide necessary barricades, flashers, flashing arrows and signs in accordance with referenced Manuals and Laws and Regulations.
 - b. Provide gravel borrow and bituminous concrete to maintain temporary passable travel lane ramps, temporary bridging, steel plates, temporary pavement, wood-framed walkways, caution, safety and other necessary signs directing the pedestrian and vehicular traffic towards unblocked and safe areas.
6. Provide safe access/egress to businesses and abutting property owners within the Project area. In areas where the construction activity is in progress, install directional signs in front of businesses indicating "OPEN FOR BUSINESS" or similar for guidance of customers.

- a. Certain construction operations such as utility work and roadway/sidewalk reconstruction may restrict access/egress on some roads and to businesses and abutting property owners. Under these circumstances, schedule operations during off-peak hours or late evenings with Owner approval so that a particular work activity can be completed in the shortest possible time.
- b. Provide 48 hours notice to businesses and abutting property owners when access/egress will not be available or restrictions will exist.
7. Exercise particular care to establish and maintain such methods and procedures that will not create hazards.
 - a. Remove or properly cover traffic control, safety devices and/or signs having messages that are irrelevant to normal traffic conditions at the end of each Work period. Keep signs clean at all times and provide that legends are distinctive and unmarred.
 - b. Place excavated material and construction equipment so that vehicular and pedestrian traffic is maintained at all times unless road closure permit is obtained. If the Contractor's operations cause traffic hazards, implement appropriate safety measures immediately.
 - c. In areas of high pedestrian and vehicular traffic volume, the remove waste materials and construction equipment from the Work Site on a daily basis. Do not park construction equipment overnight on the Site or the adjacent roads unless permitted by Owner.
 - d. Provide night watchmen where special hazards exist.
8. Post signage clearly stating that any vehicle impeding the progress of construction will be towed at the vehicle owner's expense. Towing charges incurred by Owner for Contractor's failure to post such signs will be borne by the Contractor.

1.05 REMOVAL OF TEMPORARY UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, and facilities before Final Application for Payment inspection.
- B. Remove temporary underground installations and grade Site as indicated. Clean and repair damage caused by installation or use of temporary utilities, facilities, and controls.
- C. Restore existing facilities and areas used during construction to original condition. Restore permanent facilities used during construction to specified condition.

END OF SECTION

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SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies general requirements for products, materials and equipment and applies to all Specifications and Drawings.
 - 1. Provisions of this Section may supplemented in individual Specification sections.
- B. **Section Includes**
 - 1.02 SOURCE QUALITY CONTROL
 - General
 - Independent Testing Agency Certification
 - Factory Testing
 - 1.03 PRODUCT REQUIREMENTS
 - General
 - Transportation and Handling
 - Storage and Protection
 - 1.04 WARRANTIES

1.02 SOURCE QUALITY CONTROL

A. General

- 1. Subject material and equipment furnished under the Contract Documents to a complete factory testing program as specified.
- 2. Shop Drawings and submittals: reviewed by Engineer before initiating testing program.
- 3. Perform checks and tests in accordance with manufacturer's recommendations and referenced standards.
- 4. Evaluate test results and advise Owner immediately of any discrepancy between test results and test limits or the failure of any device or system under test. Include test limits for acceptability applicable to each test on the certified test records.
- 5. Record test information, including the evaluation of testing results, on forms approved by Owner and Engineer.

B. Independent Testing Agency Certification

1. If specified, furnish certificates from an independent testing agency.
2. Independent testing agency to certify that material and equipment components have been examined and tested and are in conformance with the requirements specified in the Contract Documents.
3. Take Samples in accordance with the requirements specified in the Contract Documents, as selected by Owner or independent testing agency. Furnish and ship at no additional cost to Owner.

C. Factory Testing

1. Provide 14 days prior written notice of factory inspections and tests to Owner and Engineer.
2. If failure to give proper written notice results in material and equipment being assembled or covered before a factory inspection or test, make material and equipment ready for inspection or test and reassemble or recover at no additional cost to Owner.
3. Owner may inspect any portion of material and equipment furnished at any reasonable time during manufacture and may witness testing of any portion of material and equipment wherever located. Owner and Engineer to witness tests only.
4. Furnish, set up and operate test equipment and facilities.
5. If facilities for conducting required tests are unavailable to the manufacturer, conduct tests elsewhere or have them performed by an independent agency approved by Owner.
6. Protect material and equipment after testing and checking to provide that subsequent testing of other equipment or systems does not disturb, damage or otherwise interfere with functional capability of material and equipment.
7. Assume responsibility for protection of material and equipment and safety of all personnel during factory testing program.
8. Grounds for rejection: failure to withstand tests; failure to meet ratings; failure to meet applicable standards.

9. In the event of failure
 - a. Submit revisions of documents requiring approval for changes required for rectification.
 - b. Obtain Owner's and Engineer's approval before making such changes.
 - c. Provide written details of any changes to be made not requiring approval.
 - d. Notify Owner and Engineer in writing before retesting.
 - e. Furnish new material and equipment which meets requirements of the Specifications if rejected material and equipment cannot be rectified to satisfaction of Owner and Engineer.
 - f. Retest after rectification in presence of Owner or Engineer.
10. Assume responsibility for all costs, including, but not limited to: loss or damage to materials and equipment resulting from testing; retesting; rectification; new material and equipment to replace damaged or non-rectifiable material and equipment; removal, furnishing, transportation, unloading, and installation of replacement material and equipment; and witness of testing by Owner and Engineer including travel, lodging, meals, and payroll.
11. Submit certified test reports which define tests, list results, and are signed by Contractor's representative, and copies of raw data collected during tests. Submission of certified test reports does not relieve Contractor of responsibility for material and equipment meeting requirements of the Contract Documents after installation.

1.03 PRODUCT REQUIREMENTS

A. General

1. Products include new material and equipment incorporated into the Work and may also include existing material and equipment required for reuse. This does not include machinery and equipment used for preparation, fabrication, conveying, installation and erection of the Work.
2. Do not use materials and equipment removed from existing Work Site, except as specifically permitted.
3. Provide complete with accessories, trim, finished, safety guards, and other devices and details need for a complete installation and for the intended use or effect.

4. Provide standard products which have been produced and used successfully on other similar projects for similar applications. Provide products which are likely to be available to Owner in the future for items required for maintenance and repair or replacement Work.
5. Furnish interchangeable components of the same manufacturer, for similar components.

B. Transportation and Handling

1. Transport and handle material and equipment in accordance with manufacturer's instructions.
2. Notify Engineer and Owner in writing upon acceptance of a shipment.
3. Promptly inspect shipments to assure that material and equipment comply with requirements, quantities are correct, and material and equipment are undamaged.
4. Furnish equipment and personnel to handle material and equipment by methods to prevent soiling, disfigurement, or damage.
5. Uncrate equipment and dispose of packing material properly.

C. Storage and Protection

1. Store and protect material and equipment in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive material and equipment in weather tight, climate controlled enclosures.
2. For exterior storage of fabricated material and equipment, place on sloped supports, above ground.
3. Provide for bonded off Site storage and protection when Site does not permit on Site storage or protection.
4. Cover material and equipment subject to deterioration with impervious sheet covering. Furnish ventilation to avoid condensation or potential degradation of material and equipment.
5. Store loose granular materials on solid flat surfaces in a well-drained area. Avoid mixing with foreign matter.
6. Furnish equipment and personnel to store material and equipment by methods to prevent soiling, disfigurement, or damage.

7. Arrange storage of material and equipment to permit access for inspection. Periodically inspect to assure material and equipment are undamaged and are maintained in acceptable conditions.
8. After receipt of material and equipment, assume responsibility for loss and damage including but not limited to breakage, corrosion, weather damage, and distortion.

1.04 WARRANTIES

- A. Provide warranties for equipment and material in accordance with Paragraphs 6.19 and 14.03 of the Standard General and Supplementary Conditions, if any.
- B. Provide extended or special warranties as indicated in individual Specification sections.

END OF SECTION

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SECTION 01 70 00

EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies general execution requirements and startup/commissioning and performance testing for closeout of the Work and applies to all Specifications and Drawings
 - 1. In certain Paragraphs, checked items indicate requirements applicable to the Project.
 - 2. Provisions of this Section may be supplemented in the **Specific Project Requirements and Procedures** or other sections of Division 01.

B. Section Includes

- 1.02 OVERALL EXECUTION REQUIREMENTS
 - Coordination
 - Existing Conditions
 - Field Engineering
 - Record Documents
 - Cutting and Patching
 - Electrolytic Corrosion Prevention
 - Quality Assurance and Control of Installation
 - Manufacturers' Field Services
 - Independent Testing
- 1.03 STARTUP, TESTING, AND COMMISSIONING
 - Spare Parts
 - Consumables
 - Checkout and Starting Systems
 - Starting, Adjusting, and Balancing
 - Startup and Commissioning/Performance Testing
 - Demonstration and Training

1.02 OVERALL EXECUTION REQUIREMENTS

A. Coordination

1. Conduct preconstruction and pre-installation meetings before commencing certain Work that requires coordination or has special requirements or approvals.
 2. Comply with the required Work sequence and coordination as may be specified in Summary of Work and reflect in the Project scheduling.
 3. Coordinate Work such that Work is completed with minimum disruption to residents and businesses.
 4. Coordinate space requirements and installation of Work. Utilize spaces efficiently to maximize accessibility for other installations, maintenance, and repairs.
 5. Coordinate Work of the various Specifications with interdependent responsibilities for installing, connecting to, and placing in service, operating equipment.
 6. Coordinate related Work at the Site in accordance with Article 7 of the Standard General and Supplementary Conditions, if any.
 7. Coordinate completion and cleanup of Work of separate sections in preparation for Substantial Completion and for portions of Work designated for Owner's partial occupancy.
 8. After Owner occupancy of premises, coordinate access to Site for correction of defective Work and/or incomplete Work to minimize disruption of Owner's activities.
- ☒ See the **Specific Project Requirements and Procedures** for additional requirements.

B. Existing Conditions

1. Paragraph 4.01 of the Standard General and Supplementary Conditions, if any, covers Availability of Lands.
 - ☒ No information is identified or available for the Project.
 - ☐ Information identified is included as an attachment to the **Specific Project Requirements and Procedures**.

2. Paragraph 4.02 of the Standard General and Supplementary Conditions, if any, covers Subsurface and Physical Conditions.
 - ☒ No information is identified or available for the Project.
 - ☐ Information identified is included as an attachment to the **Specific Project Requirements and Procedures**.
3. Pursuant to Paragraph 4.04 of the Standard General and Supplementary Conditions, if any, existence and location of Underground Facilities and other utilities and construction indicated as existing are not guaranteed. Before beginning Work investigate and verify the existence and location of Underground Facilities and other utilities and construction.
 - ☒ Conduct test pits and other utility research and properly restore utilities interfered with or damaged during construction at no cost to the Owner.
 - ☐ Engage a professional subsurface utility locator to verify the existence and location of underground utilities prior to starting Work
 - ☐ See the **Specific Project Requirements and Procedures** for additional requirements.
4. Paragraph 4.05 of the Standard General and Supplementary Conditions, if any, covers Reference Points.
 - ☒ No information is identified or available for the Project.
 - ☐ Information is included in the **Specific Project Requirements and Procedures**.
5. Paragraph 4.06 of the Standard General and Supplementary Conditions, if any, covers Hazardous Environmental Conditions at Site.
 - ☒ No information is identified or available for the Project.
 - ☐ Information identified is included as an attachment to the **Specific Project Requirements and Procedures**.
 - ☐ Other information is included as an attachment to the **Specific Project Requirements and Procedures**.

C. Field Engineering

- ☒ Delete - not required for the Project.
- ☐ Provide for the Project as follows.
 1. Prior to initiating construction, engage an independent professional land surveyor registered in the state where the Project is located to provide surveys and permanent reference points for all bounds and property markers along the line of the Work that may be disturbed during construction. Submit copies of all ties to the bounds and property markers to the Engineer prior to excavation at the Site(s).
 2. Maintain surveyor's log of control and other survey work. Keep log available for reference.
 3. Verify layout information shown on the Drawings in relation to existing benchmarks before lay out of the Work. Locate and protect existing benchmarks and control points. Preserve permanent reference points during construction.
 4. Promptly report lost or destroyed reference points, benchmarks, or control points. Promptly report requirements relocate reference and control points due to changes in grades. Promptly replace lost or destroyed bounds or markers and control points based on the original survey control points utilizing the services of a professional land surveyor registered in the state where the Project is located. The cost of replacing markers disturbed by the Contractor's operations shall be at the Contractor's expense.
- ☐ See the **Specific Project Requirements and Procedures** for additional requirements.

D. Record Documents

1. Provide Record Documents in accordance with Paragraph 6.12 of the Standard General and Supplementary Conditions, if any, and in accordance with the **Payment and Administrative Procedures**.
2. Store Record Documents separate from documents used for construction. Record information concurrent with construction progress.

3. Legibly mark each item to record description of actual equipment and material installed and actual construction on approved submittals, including the following.
 - a. Manufacturer's name and equipment and material model and number
 - b. Material and equipment substitutions or alternates utilized
 - c. Approved changes
 - d. Measured depths of foundations
 - e. Measured horizontal and vertical locations of Underground Facilities and appurtenances, referenced to permanent surface improvements
 - f. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work
 - g. Field changes of dimension and detail
 - h. Details not on original Contract Documents or Shop Drawings

E. Cutting and Patching

1. Employ skilled and experienced personnel to perform cutting and patching.
2. Submit written request in advance of cutting or alteration which affects:
 - a. structural integrity of any element of Project;
 - b. integrity of weather exposed or moisture resistant elements;
 - c. efficiency, maintenance, or safety element;
 - d. safety, traffic, or hazard barriers;
 - e. visual qualities of sight exposed elements; and
 - f. work of Owner or separate contractor.
3. Execute cutting, fitting, and patching including excavation and fill to complete Work and to:
 - a. fit materials together, to integrate with other work;
 - b. uncover Work to install ill-timed Work;
 - c. remove and replace defective or non-conforming Work;

- d. remove Samples of installed Work for testing when requested; and
 - e. provide openings in element of Work for penetration of mechanical and electrical work.
- 4. Execute Work by methods to avoid damage to other work and which will provide appropriate surfaces to receive patching and finishing.
 - 5. Provide adequate temporary support for Work to be cut.
 - 6. Restore Work with new materials in accordance with requirements of Contract Documents. Use materials identical with original materials where recognized that satisfactory results can be produced.
 - 7. Provide protection from elements for areas which may be exposed by uncovering work.
 - 8. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit. Restore exposed finishes of patched areas; and, where necessary extend finish restoration onto retained adjoining Work in a manner, which will eliminate evidence of patching.
 - 9. Identify any Hazardous Waste, Hazardous Environmental Condition, or hazardous substance exposed during the Work to Owner for decision or remedy in accordance with Paragraph 4.06 of the Standard General and Supplementary Conditions, if any.
 - 10. Cut work by methods least likely to damage Work to be retained and work adjoining. Cut Work with sawing and grinding tools, not with hammering, chopping, or burning tools. Cut masonry and concrete materials with masonry saw or core drill. Do not use pneumatic tools without prior approval. Core drill openings through concrete Work. Adhere to mandatory cutback requirements when saw cutting concrete and roadway openings.
 - 11. Do not cut and patch structural Work in a manner resulting in reduction of load-carrying capacity or load/ deflection ratio.
 - 12. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces. Maintain supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage and seal voids. For interior work at penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire resistant material, to full thickness of the penetrated element.

13. Do not cut and patch operational or safety-related components that reduce capacities to perform in manner intended. Do not cut and patch Work that reduces visual qualities. Remove and replace unsatisfactory cutting patching as directed by Engineer or Owner.

F. Electrolytic Corrosion Prevention

1. Prevent galvanic action, bimetallic corrosion, anodic or cathodic action, and electrolysis at all electrical grounds and for all galvanic scale (electromotive series or table of oxidation potentials). Do not allow contact of dissimilar metals further apart than 0.35 on the galvanic scale (electromotive series or table of oxidation potentials). The electrode potential of common metals is listed below.

	Electrode Potential Volts (Relative to Hydrogen)
Magnesium	+2.37
Aluminum	+1.70
Zinc+	+0.76
Chromium	+0.56
Iron and Steel	+0.44
Cadmium	+0.40
Nickel	+0.25
Tin	+0.14
Lead	+0.13
Copper	-0.34

2. Unless otherwise indicated, provide dielectric insulators between ferrous and nonferrous pipe and equipment.

G. Quality Assurance and Control of Installation

1. Monitor quality control of Subcontractors, Suppliers, manufacturers, material, equipment, services, Site conditions, and workmanship, to produce Work of specified quality. Conduct field quality control and testing specified.
2. Comply fully with manufacturers' installation instructions, including each step in sequence. If manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
3. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

4. Perform Work using persons qualified to produce workmanship of specified quality.
5. Install field Samples and mockups at the Site as required in Specifications for review. Acceptable Samples and mockups represent a quality level for the Work. Where field Sample or mockup is specified to be removed, clear area after field Sample or mockup has been accepted by Engineer or after Work is complete when mockup is to serve as a control reference.
6. Protect adjacent construction in accordance with Paragraph 6.13 of the Standard General and Supplementary Conditions, if any.

H. Manufacturers' Field Services

1. If required in the Specifications, arrange and pay for material or equipment Suppliers or manufacturers to provide qualified staff personnel (field representative) to perform the following services and services specified. Submit reports of activities, actions taken and test results to Engineer within 10 days of completion.
 - a. Observe Site conditions, conditions of surfaces and installation, quality of workmanship.
 - b. Report observations and Site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
 - c. Assist with field assembly as required.
 - d. Furnish, setup, and operate required test equipment and facilities.
 - e. Perform and record results of manufacturer recommended inspections and tests, and tests specified for material and equipment.
 - f. Be responsible for protection of material and equipment and safety of all personnel during testing.
 - g. Perform any other services normally provided by field representative's company.
 - h. Instruct operating personnel in proper use of material and equipment.
 - i. Instruct and supervise field repairs before acceptance by Owner.

I. Independent Testing

1. Employ and pay for specified services of an independent firm in accordance with Paragraph 13.03 of the Standard General and Supplementary Conditions to perform inspection and testing as may be specified except where responsibility for a specific inspection or test is expressly allocated to Owner in the Specifications or by Laws and Regulations.
2. Reports will be submitted by the independent firm to Owner, in duplicate indicating observations and results of tests and indicating compliance or noncompliance with Contract Documents.
3. Inspection, testing, and source quality control may occur on or off the Project Site.
4. Cooperate with independent firm. Furnish samples of materials, design mix, equipment, tools, storage and assistance as requested.
5. Notify Owner and independent firm 24 hours before expected time for operations requiring services.
6. Make arrangements with independent firm and pay for additional Samples and tests required for Contractor's use.
7. Retesting required because of nonconformance to specified requirements will be performed by the same independent firm if instructed by Owner. Payment for retesting will be charged to Contractor by deducting inspection or testing charges from the Contract Price.
8. Testing or inspecting does not relieve Contractor from performing Work in accordance with requirements of the Contract Documents.

1.03 STARTUP, TESTING, AND COMMISSIONING

A. Spare Parts

1. Provide spare parts required for construction, startup, testing and commissioning of the Work prior to achievement of Substantial Completion, including spare parts for flushing and consumable supplies such as bolts, nuts, gaskets, filters, insulating tape, etc., normally consumed in the startup, commissioning and testing.
2. If spare parts are purchased by Owner, Contractor shall have the right to use the spare parts purchased by Owner provided that such spare parts are replaced prior to Substantial Completion at Contractor's expense. Replacement spare parts, replaced by Contractor, shall be new, unused and identical as the original spare part used.

B. Consumables

1. Provide initial fills of consumables including equipment lubricants, resins, chemicals, desiccants, and fuels. Provide subsequent fills if required during Warranty Period if acts or omissions of Contractor cause such consumables to require replacement.
2. Coordinate with Owner for consumables required.

C. Checkout and Starting Systems

1. Coordinate schedule for startup and operation of various equipment and systems with Owner.
2. Notify Owner 7 days before startup of each major piece of equipment or system, including a staffing request for Owner's operations and maintenance personnel required to adequately and safely support each specific start-up and operation activity.
3. Verify that each system or piece of equipment item has been assembled, constructed, or completed in accordance with the Contract and capable of functioning as intended.
4. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, magnetic center alignment, belt tension, control sequence, or other conditions which may cause damage.
5. Verify that each piece of equipment or system has successfully completed construction testing and cold commissioning, including hydrostatic testing, loop checks, relay checks, calibration, and continuity checks and that all tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
6. Verify wiring and support components for equipment are complete and tested.
7. Execute start up under supervision of responsible manufacturers' representative or Contractor's personnel in accordance with manufacturers' instructions utilizing Owner's qualified operations and maintenance staff trained by Contractor.
8. When specified in individual Specification Sections, require manufacturer to provide field representative to be present at Site to inspect, check and approve equipment or system installation before start up, and to supervise placing equipment or system in operation.

D. Adjusting and Balancing

1. Supply necessary equipment, material, construction power, and consumables (except for those provided by Owner) needed to startup and fully test the Work and replenish the same until Substantial Completion is achieved. Contractor may utilize Owner's operating spare parts, such use requiring timely replacement at Contractor's expense.
2. Coordinate as required for conduct of independent testing.
3. Perform specified and required adjusting and balancing concurrently to the maximum extent possible on individual equipment and systems and prior to startup and commissioning/performance testing.

E. Startup and Commissioning/Performance Testing

1. Conduct startup and commissioning/performance tests to demonstrate the Work meets the requirements of the Contract Documents, satisfies the Owner's requirements, and is in accordance with Paragraph 14.04. of the Standard General and Supplementary Conditions, if any. Conduct testing in accordance with
 - ☒ individual Specification sections.
 - ☐ the separate Startup, Commissioning, and Testing section.
 - ☐ the **Specific Project Requirements and Procedures**.
2. Prepare and submit a written startup and commissioning/performance testing procedures no later than 60 days prior to start of testing for review and final test procedures no later than 30 days prior to start of testing. Submit a staffing request for Owner's operations and maintenance personnel.
3. Calibrate test equipment and instrumentation on Site or provide acceptable certificate of calibration conducted within 30 days of testing.
4. Complete functional testing prior to initiating the startup and commissioning/performance testing as specified.
5. Complete specified startup and commissioning/performance tests prior to Substantial Completion. Owner and Engineer will witness Performance Testing. Notify Owner and Engineer in writing at least 7 days prior to starting any startup and commissioning/performance testing. Coordinate for witnessing of tests by required regulatory representatives.
6. Submit written test reports.

F. Demonstration and Training

1. Provide formal demonstration and training of Owner's personnel as specified in
 - ☒ individual Specification sections.
 - ☐ the separate Demonstration and Training section.
 - ☐ the **Specific Project Requirements and Procedures**.

END OF SECTION

SECTION 03 11 00

CONCRETE FORMING

PART 1 – GENERAL

1.01 SUMMARY

- A. The Work of this section comprises all materials, tools, equipment and labor required for the design, preparation and cleaning, construction, and removal of all concrete formwork, and the installation of all concrete embedments furnished under other sections, necessary for the proper completion of the Work in accordance with this Section and applicable reference standards listed in Article 1.03.
- B. Related Requirements
 - 1. Section 03 30 20 – Concrete Placing, Curing and Finishing

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and Payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. American Concrete Institute International (ACI)
 - a. ACI 117 Specifications for Tolerances for Concrete Construction and Materials and Commentary
 - b. ACI 301 Specifications for Structural Concrete
 - c. ACI 347 Guide to Formwork for Concrete
 - 2. ASTM International (ASTM)
 - a. ASTM C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field
 - b. ASTM C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Product Data
 - 1. Form Ties
 - 2. Form Release Agent
 - 3. Waterstops, including details at all corners and intersections, which shall be factory formed
 - 4. Form Ties
 - 5. Form Release Agent
 - 6. Waterstops
- C. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. General
 - 1. Formwork shall conform dimensionally to the concrete Work as shown on the Drawings. To minimize the number of panel joints, formwork panels shall be of the largest practicable sizes.
 - 2. Undamaged smooth form facing materials such as plywood, hardboard, metal, and plastic, that will produce a smooth form finish, shall be used. Formwork shall not result in fins or offsets exceeding 1/8 inch. If used, aluminum forms with un-oxidized surfaces shall be pretreated with a paste

made of calcium hydroxide and water, followed by water rinsing, repeated until hydrogen bubbles do not form.

B. Form Release Agent

1. Form release agent shall be non-grain raising, non-staining, and shall not leave a residue on the concrete nor adversely affect bonding of materials to be applied.

C. Form Ties

1. General Requirements:
 - a. Form ties shall be adjustable length, sized to withstand construction loads, and upon removal shall prevent concrete spalling. Ties shall have break back indentation.
 - b. Plastic Cones: Form tie assembly with cone-shaped depressions at the concrete surfaces with break back ties. The portion of the tie remaining embedded in the concrete upon removal shall be equal to the depth of the cone specified. 1" diameter x 1" deep (Standard)
 - c. Tie Systems that include plug style waterstops inserted into tie holes after removal of forms are not permitted.

D. Hydrophilic Waterstops

1. Hydrophilic waterstops, where noted on the Drawings, shall be non-bentonite, expansive rubber strip: CJ-1020-2K by Sika Hydrotite, Swellseal Joint as manufactured by DeNeef Construction Chemicals, Inc., ConSeal CS-231 by Concrete Sealants, Inc., or approved equal.

2.02 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 TECHNICAL REQUIREMENTS

- A. The Contractor shall design, erect, shore, brace, and maintain formwork in accordance with ACI 301 to support all loads, including construction loads, until the concrete structure can support such loads.

3.02 CONSTRUCTION

- A. Tolerances

1. Tolerances shall be in accordance with ACI 117.

B. Form Alignment

1. At locations where continuous surfaces are formed in successive units, forms shall be tightly fitted over the hardened concrete surface to obtain accurate surface alignment and to prevent leakage of mortar and the formation of fins, ridges, and other defects.

C. Chamfered Edges

1. All exposed concrete corners shall be formed with beveled strips to provide 3/4 inch chamfers, unless otherwise shown, specified, or directed by the Engineer.
2. Where concrete walls, columns, and beams abut masonry walls, the chamfer shall be omitted.
3. Where masonry walls are flush with the face of supporting concrete curbs, the chamfer shall be omitted.
4. Chamfering by grinding is prohibited.

D. Openings

1. Form openings in concrete where required for other Work. Upon failing to form such openings, provide them in a manner approved by the Engineer at no additional cost to the Owner.
2. Except as otherwise specified, all such openings shall be filled with concrete after the Work to be installed therein is complete.

E. Cleanouts and Access Panels

1. Temporary openings shall be provided to facilitate cleaning and inspection prior to concrete placement, including at the bottom of wall forms. Cleanout openings are not permitted in exposed concrete, concrete exposed to view upon completion of the Work, whether or not it is painted, without the approval of the Engineer.
2. All refuse, sawdust, shavings, etc. shall be removed, and the forms broom cleaned before concrete placement.

F. Form Release Agent

1. Forms shall be coated with the approved form release agent before placement of reinforcing steel. Do not apply form release agent at locations of monolithic construction joints, which are construction joints with all the reinforcement continuous through the joint. Excess agent

applied to the forms, and on the reinforcing steel and other surfaces requiring a concrete bond, shall be removed.

2. Forms for unexposed surfaces may be thoroughly wetted in lieu of the approved form release agent immediately before concrete is placed. However, form release agent shall be used in freezing weather.

G. Hydrophilic Waterstop

1. Hydrophilic waterstop shall be continuous, and installed in strict accordance with the manufacturer's instructions, in double rows with a space between, at each joint. Any extended contact with standing water, such as puddles, is not permitted.

3.03 INSTALLATION OF EMBEDDED ITEMS

A. General

1. Coordinate the setting of anchor bolts, thimbles, inserts, wall pipe, sleeves, and other embedded items. Before placing concrete, ensure that all items are accurately located and firmly secured against displacement.
2. All items shall be thoroughly cleaned and free of loose rust, mill scale, dirt, grease, etc. Wood used for removable keys shall be thoroughly dampened before concrete is placed against it.

B. Electrical Conduit

1. Electrical conduit may be embedded in concrete provided the following conditions are met.
 - a. Outside diameter of conduit shall not exceed 1/3 of concrete thickness.
 - b. Conduit shall not be placed closer than 3 diameters on center.
 - c. Conduit shall not significantly impair the strength of the construction.
 - d. Conduit shall not be embedded in structural concrete slabs less than 4 inches thick.
 - e. Only 2 conduits may cross at any point. The sum of the outside diameter of the crossing conduits shall not exceed 1/3 of the concrete thickness.
 - f. A 1-1/2 inch minimum concrete cover shall be provided for conduits in structural slabs.
 - g. Conduit shall not be located between bottom of reinforcing steel and bottom of slab.

- h. Conduit is not permitted in beams, girders, and columns without the approval of the Engineer.
 - i. Aluminum conduit shall not be embedded in concrete.
 - j. Conduit shall be installed so that cutting, bending, or displacement of reinforcement from its proper location is not necessary.
2. Contractor shall notify Engineer of any embedded conduits not installed according the conditions specified herein a minimum of 24 hours prior to concrete placement. Noncompliant conduit placements shall be repositioned or removed to the satisfaction of the engineer and owner's representative.

3.04 REMOVAL

A. Form Removal

- 1. Form removal per ACI 347, as modified herein.
- 2. Forms shall be removed while ensuring the complete safety and serviceability of the structure. Forms or shoring for slabs, beams, and other suspended members shall not be removed until members are of sufficient strength to safely support their own weight and the weight thereon.
- 3. Newly unsupported portions of the structure shall not be subjected to heavy construction or material loading. Additional shores or re-shores shall be provided as required to adequately support the members during the construction period.
- 4. The Contractor shall be responsible for the proper removal of forms, shores, and bracing.
- 5. Spalling of concrete surfaces shall be prevented.
- 6. When forms are removed before the specified curing period (as specified in Section 03 30 20) is complete, measures shall be taken to continue curing and to continue providing thermal protection for the concrete.
- 7. Forms may be removed when the cumulative time during which the temperature of the air surrounding the concrete is above 50 degrees F are as follows
 - a. Walls, columns, sides of beams and girders, and similar parts of the Work not supporting the weight of the concrete: 24 hours.
 - b. When design superimposed load is less than the self-weight
 - 1) Beam and Girder Soffits

- a) Clear span less than 10 feet: 7 days
 - b) Clear span 10 feet to 20 feet: 14 days
 - c) Clear span more than 20 feet: 21 days
- 2) Slabs
 - a) Clear span less than 10 feet: 4 days
 - b) Clear span 10 feet to 20 feet: 7 days
 - c) Clear span more than 20 feet: 10 days
- c. When design superimposed load is more than the self-weight
 - 1) Beam and Girder Soffits
 - a) Clear span less than 10 feet: 4 days
 - b) Clear span 10 feet to 20 feet: 7 days
 - c) Clear span more than 20 feet: 14 days
 - 2) Slabs:
 - a) Clear span less than 10 feet: 3 days
 - b) Clear span 10 feet to 20 feet: 4 days
 - c) Clear span more than 20 feet: 7 days
- d. Alternatively to the stripping times specified, additional concrete cylinders shall be made using representative concrete, witnessed and approved by the Engineer, and tested at no additional cost to the Owner. Such specimens shall be field cured in accordance with ASTM C31 under conditions that are not more favorable than the most unfavorable conditions for the portions of the concrete that the test specimens represent. The supporting forms and shores may be removed when the concrete strength as tested per ASTM C39 is a minimum of 70 percent of the specified design strength, as determined by the field-cured cylinders according to ACI 301.

B. Tie Holes

- 1. Filling of form tie holes and concrete finishing are specified in Section 03 30 20.

3.05 CLEANING AND REPAIR OF FORMS

- A. Parts of forms reserved for reuse shall be inspected, cleaned, and repaired. Any parts dented, deformed, or otherwise rendered unfit for reuse shall be discarded.

3.06 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.07 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

SECTION 03 16 00

CONCRETE SPECIALTIES

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide all materials, tools, equipment, and labor necessary for the construction of concrete specialties as specified, as shown on the Drawings, and as necessary for the proper completion of the Work in accordance with this section and applicable reference standards listed in Article 1.03.
2. Epoxy adhesive for installing drilled and epoxy rebar is specified herein.
3. Post-installed expansion anchors and adhesive anchoring systems are specified in Section 05 50 00.

B. Related Requirements

1. Section 03 30 00 – Cast-In-Place Concrete
2. Section 03 30 20 – Concrete Placing, Curing and Finishing
3. Section 05 50 00 – Metal Fabrications

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. American Society for Testing and Materials (ASTM)
 - a. ASTM A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
 - b. ASTM A1064 Standard Specification Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
 - c. ASTM C1107 Standard Specification for Packed Dry, Hydraulic-Cement Grout (Non-shrink)
 - d. ASTM D4832 Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders
2. ICC Evaluation Service (ICC-ES)

- a. ICC-ES AC308 Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements
- 3. American Concrete Institute (ACI)
 - a. ACI 355.2 Qualification of Post-Installed Mechanical Anchors in Concrete
 - b. ACI 355.4 Qualification of Post-Installed Adhesive Anchors in Concrete

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Product Data
 - 1. Non-Shrink Grout
 - 2. Epoxy Adhesive (for drill and epoxy rebar)
 - a. ICC-ES report for manufacturer's specific product
 - b. Epoxy ultimate bond strength
 - c. Manufacture's chart for embedment to develop yield strength and tensile strength of ASTM A615, grade 60, rebar sizes #3 thru #11.
 - d. Storage requirements
 - e. Gel and cure times as a function of temperature
 - f. Installation temperature requirements for cartridges and base material
 - g. Drilling method (diamond drill bit shall be prohibited)
 - h. Drill bit diameter and depth of hole for rebar sizes
 - i. Hole cleaning procedure and required condition of hole
 - j. Requirements for discarding initial discharge to ensure proper mixing
 - k. Hole filling procedure
 - l. Time period when anchor cannot be contacted or otherwise disturbed
- C. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.
- B. Qualifications: per Division 01 General Requirements for anchor installation and as follows.
 - 1. Anchors shall be installed by qualified personnel trained to install adhesive anchors.
 - 2. Adhesive anchors shall be installed in strict accordance with the Manufacturer's Printed Installation Instructions (MPII).
 - 3. Each installer shall have the MPII in their possession at all times.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 GROUT

- A. Grout shall be non-metallic, cementitious non-shrink grout meeting ASTM C1107, grade C. Grout shall be Five Star Grout by U.S. Grout Company, Crystex or Premier by L&M Construction Chemicals, Inc., Sure-Grip High Performance Grout, by Dayton Superior, or approved equal.

2.02 EPOXY ADHESIVE

- A. Epoxy adhesive for installation of post-installed reinforcing bars denoted as “Drill and Epoxy” or “Drill & Epoxy” on drawings.
- B. Evaluation Requirements: ICC-ES evaluation report stating product is compliant with 2015 International Building Code and approved for use to resist static, wind and earthquake (Seismic Design Categories A through F) tension and shear loads in cracked and uncracked normal-weight concrete having a compressive strength of 2,500 psi to 8,500 psi. Evaluation reports with a listed renewal date month/year which is prior to the month/year the product is submitted for engineer's review will be rejected.
- C. Epoxy adhesive for anchoring reinforcement to concrete shall be a 2-component solid epoxy based system supplied in manufacturer's standard side-by-side cartridge and dispensed through manufacturer's standard static-mixing nozzle. Epoxy adhesive shall be:

1. Simpson Strong Tie: SET-XP or ET-HP
 - a. SET-XP Compliance Report (ESR-2508)
 - b. ET-HP Compliance Report (ESR-3372)
 2. Hilit: HIT-RE 500 V3
 - a. Compliance Report (ESR-3814)
 3. Approved equal based
 - a. Compliance Report to be submitted
- D. Epoxy adhesive shall pass the creep test requirements of ICC-ES AC58.
- E. The embedment depth shall be per the manufacturer's requirements and the ultimate strength exceeds the tensile strength of the bar, and the ultimate strength divided by a minimum factor of safety of 3.75 is at least 40 percent of the yield strength of the bar.

2.03 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 EQUIPMENT PADS

- A. New concrete surfaces upon which equipment pads are to be built shall receive a scratched finish in accordance with Section 03 30 20.
- B. All laitance shall be removed and the surface shall be saturated with water for a minimum of 6 hours. Excess water shall then be removed and the epoxy bonding compound applied as specified in Section 03 30 20.
- C. All equipment pads shall be sized to suit the approved equipment, and reinforcement shall be as shown on the Drawings.
- D. The top surface shall be level within 1/8-inch. All exposed faces shall be formed with smooth forms and shall be smooth and free of sands streaks, bug holes, and honeycomb. All exposed surfaces shall have a smooth, even surface with all exterior corners chamfered. Exposed faces of pads shall receive a sack-rubbed finish as specified in Section 03 30 20.
- E. All anchor bolts, dowels, sleeves, and other fittings required for the equipment shall be built in.

3.02 GROUTING

- A. Grouting is required for structural, mechanical, and electrical items, and shall be in accordance with the manufacturer's recommendations.
- B. Concrete surfaces to receive grout shall be cleaned of all contamination and debris. Surface roughening shall be required if laitance or poor concrete is evident.
- C. Grout placement shall be rapid and continuous such that grout completely fills the space to be grouted, absent of air pockets.
- D. Grout may be placed by gravity or pumped. When practical, grout shall be placed from one side and made to flow to the open side to prevent the formation of air pockets.

3.03 EXISTING CONCRETE

- A. Where equipment pads are to be constructed, grouting is to be performed, and concrete fills are to be placed against existing concrete, the following surface preparation shall be required.
 - 1. The existing concrete surface shall be cleaned of all contamination and debris, and roughened by steel shot blasting, abrasive sand blasting, or water jetting. Use of scabblers, scarifiers, bush hammers, and pneumatic hammers is not permitted.
 - 2. The existing concrete surface shall be water-saturated for a minimum of 6 hours, after which the excess water shall be removed immediately prior to placement of new concrete or grout.
 - 3. In areas where equipment pads are to be constructed and concrete fills are to be placed, apply epoxy-bonding compound (as specified in Section 03 30 20) to prepared concrete surface prior to concrete placement.

3.04 EPOXY ADHESIVE

- A. Installation: Per manufacturer's installation instructions and as listed in the product ICC-ES Evaluation Report
- B. Drilled and epoxied rebar shall be installed in concrete having a minimum age of 21 days at time of installation.
- C. All cartridges shall have the expiration date clearly visible. Material past its expiration date shall not be used, and shall be immediately removed from the Site.
- D. Diamond drill bits are not permitted. Hammer drills shall be used. Hole diameter size per manufacturer's installation instructions.

- E. The initial material extruded from each cartridge shall be discarded in accordance with the manufacturer's instructions to ensure that all material is properly mixed.
- F. Depth stop shall be used to ensure correct drilling depth. Drilled holes shall be blown out with air, thoroughly wire brushed with a repeated back and forth movement, blown out, thoroughly wire brushed, and blown out again. Adhesive shall be injected, starting from the bottom of the hole and slowly withdrawn as filling progresses to prevent air pockets.
- G. Rebar shall remain completely undisturbed between the manufacturer's specified gel time and the full cure time. Zero load shall be applied during this time.

3.05 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.
- B. Manufacturer's Field Services
 - 1. Epoxy Adhesive
 - a. Except where specified to be performed by personnel certified by an applicable program such as the ACI/CRSI Adhesive Anchor Installer Certification program or equivalent, as approved by the Engineer, the Contractor shall furnish the services of a competent manufacturer's field representative who shall be present at the Work Site prior to beginning installation in order to instruct the Contractor and the Engineer on proper installation and inspection procedures. Such instruction shall include a full and complete demonstration.

3.06 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

SECTION 03 20 00

CONCRETE REINFORCING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide all materials, tools, equipment, and labor necessary for the fabrication and installation of all reinforcement as shown on the Drawings, as specified, and as necessary for the proper completion of the Work in accordance with this Section and applicable reference standards listed in Article 1.03.

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. American Concrete Institute (ACI)
 - a. ACI 117 Specifications for Tolerances for Concrete Construction and Materials and Commentary
 - b. ACI SP-66 ACI Detailing Manual
2. American Society for Testing and Materials (ASTM)
 - a. ASTM A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
3. American Welding Society (AWS)
 - a. AWS D1.4 Structural Welding Code – Reinforcing Steel
4. Concrete Reinforcing Steel Institute (CRSI)
 - a. CRSI 10MSP Manual of Standard Practice

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Product Data
 - 1. Certified mill reports, including chemical and physical analyses
 - 2. Dowel bar splicers and dowel inserts
- C. Shop Drawings
 - 1. Reinforcement Drawings: Comply with ACI SP-66, and include the following information
 - a. Sizes, dimensions, and locations for reinforcement and supports
 - b. Bending diagrams and schedules
 - c. Splices
 - d. Cover and clearances
 - e. Class designation and details of bar supports
 - f. Pertinent reinforced concrete details with dimensions and elevations
 - g. Items furnished by other trades or under other sections of the Specification that are to be cast in concrete where interference with reinforcement may occur
 - h. Reinforcement shall be shown on wall elevations with required sections, on beam elevations with required sections, on plan views of slabs with required sections. Provide plan details where walls intersect.
- D. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.
- B. Fabricate reinforcement in accordance with ACI 117.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.
- B. Deliver reinforcement in bundles with tags indicating size, length, and identification mark.

- C. Store materials off the ground to prevent soiling and to facilitate subsequent inspection and handling.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 STEEL REINFORCEMENT

- A. General: Steel reinforcement shall include all bars, anchorages, stirrups, dowels, ties, tie-wire, chairs and other steel supports, and spacers as noted on the Drawings, specified, and as required for the proper completion of the Work.
- B. Materials
 - 1. Reinforcement bars shall be formed from new billet steel conforming to ASTM A615, Grade 60 except as otherwise specified.
- C. Tie Wire
 - 1. 16-gauge minimum
 - 2. FS QQ-W-461 annealed black, except for architectural concrete
- D. Bar Supports
 - 1. Chairs, bolsters, spacers and other supports to properly position reinforcement shall conform to the bar support recommendations of CRSI 10MSP, and shall be of adequate strength and design to prevent displacement of reinforcement and discoloration of concrete.
 - 2. Supports shall be Class 1 - plastic protected.
 - 3. Supports for bottom reinforcement of slabs on soil shall be chairs with integral plates, or precast concrete blocks not less than 4-inches square with a compressive strength equal to that of the surrounding concrete. Precast blocks may only be used to support reinforcement not more than 3-inches from the bottom of the slab.
- E. Fabrication
 - 1. Steel reinforcement shall be fabricated to the sizes, shapes and dimensions shown on the Drawings, details and schedules. All bending shall be in accordance with CRSI 10MSP. All steel shall be bent cold and shall not be bent or straightened in a manner that will injure the metal. Bars with kinks or bends not so detailed shall not be used.

2. Bends for stirrups and ties shall be made around a pin having a diameter not less than 4 times the diameter of the bar. Bends for other bars shall be made around a pin having a diameter not less than 6 times the diameter of the bar, except for bars larger than 1-inch, the pin shall be not less than 8 times the diameter of the bar.

F. Dowel Bar Splicers and Dowel Inserts (DBS/DI)

1. Dowel bar splicers shall be a 2-component threaded rebar splice system. The internally threaded component shall be forged from Grade 60 deformed rebar material free of external machining or welding. It shall contain an integral flange with nailing holes and be threaded with Unified National Coarse (UNC) or UN (unified) threads to a depth equal to the nominal diameter of the threads plus 1/4 inch. The externally threaded splice component shall be fabricated from Grade 60 deformed rebar material and supplied with rolled threads corresponding with the internally threaded component. The root diameter of the threads shall provide a minimum cross sectional area equal to the cross sectional area of the nominal bar size. Manufacturer testing shall indicate ultimate tension failure occurring in the nominal bar diameter, not at the mechanical splice.

2.02 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Reinforcement

1. Tolerances shall conform to ACI 117.
2. Placement
 - a. Reinforcement shall be accurately positioned both horizontally and vertically, and shall be properly secured and sufficiently rigid to prevent displacement during concrete placement.
 - b. Reinforcement shall be securely tied at intersections with tie wire or clips in a manner that will keep all metal away from exposed concrete surfaces.
3. Splices
 - a. Reinforcement splices shall be as shown on the Drawings. Where not shown, splices shall be located away from areas of maximum stress, and shall be approved by the Engineer.

- b. Welding shall only be permitted by written approval of the Engineer, and shall be in accordance with AWS D1.4.
- 4. All reinforcement within an area of a continuous concrete placement shall be installed, supported, and secured before beginning the concrete placement.
- 5. Reinforcement Adjustment
 - a. Adjust to within allowable tolerances to avoid interference with other reinforcement, conduits, or embedded items.
 - b. Reinforcement shall not be moved beyond allowable tolerances without the Engineer's approval.
 - c. Reinforcement shall not be heated, bent or cut without approval Engineer's approval.
- B. All reinforcement shall be entirely free from flaking rust, loose mill scale, grease, dirt, etc. that might reduce its bond with the concrete.
- C. Concrete cover for reinforcement shall conform to the dimensions shown on the Drawings.
- D. Notify the Engineer at least 24 hours before placing concrete. All reinforcement within the area of 1 day's concrete placement shall be tied in place and observed by the Engineer or Owner's representative, prior to commencing concrete placement.

3.02 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.03 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

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SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Provide cast-in-place concrete in accordance with this Section and applicable reference standards listed in Article 1.03.
- B. ACI 301 is hereby made a part of this Specification, except as otherwise modified by the Contract Documents.
- C. Related Requirements
 - 1. Section 03 30 20 – Concrete Placing, Curing and Finishing

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. American Concrete Institute International (ACI)
 - a. ACI 117 Specifications for Tolerances for Concrete Construction and Materials and Commentary
 - b. ACI 301 Specifications for Structural Concrete
 - 2. ASTM International (ASTM)
 - a. ASTM C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field
 - b. ASTM C33 Standard Specification for Concrete Aggregates
 - c. ASTM C40 Standard Test Method for Organic Impurities in Fine Aggregates for Concrete
 - d. ASTM C88 Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
 - e. ASTM C94 Standard Specification for Ready-Mixed Concrete

- f. ASTM C131 Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- g. ASTM C143 Standard Test Method for Slump of Hydraulic-Cement Concrete
- h. ASTM C150 Standard Specification for Portland Cement
- i. ASTM C173 Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
- j. ASTM C231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
- k. ASTM C260 Standard Specification for Air-Entraining Admixtures for Concrete
- l. ASTM C494 Standard Specification for Chemical Admixtures for Concrete
- m. ASTM C535 Standard Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- n. ASTM C595 Standard Specification for Blended Hydraulic Cements
- o. ASTM C618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
- p. ASTM C989 Standard Specification for Slag Cement for Use in Concrete and Mortars
- q. ASTM C1116 Standard Specification for Fiber-Reinforced Concrete
- r. ASTM C1157 Standard Specification for Hydraulic Cement
- s. ASTM C1260 Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
- t. ASTM C1293 Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction
- u. ASTM C1567 Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
- v. ASTM C1602 Standard Specification for Mixing Water Used in Production of Hydraulic Cement Concrete
- w. ASTM E329 Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with the Division 01 General Requirements.
 - 1. Test Reports
 - a. Provide reports by testing agencies meeting ASTM E329.
 - 2. Design Data for Each Concrete Mixture
 - a. Submit at minimum 14 days before initial placement of concrete.
 - b. Proportions for all ingredients, 28-day design compressive strength, water to cementitious materials ratio, admixture dosages, slump, and air content.
 - c. Test data supporting proportions based upon laboratory trial batches or field test records per ACI 301 Section 4, Concrete Mixtures.
 - 1) Field test data used to determine the standard deviation used for establishing the required average design strength shall be from within the previous 12 months, per ACI 301.
 - 2) Field test data documenting that the proposed concrete proportions will produce an average compressive strength equal to or greater than the required average compressive strength shall be from within the 12 months.
 - 3) Laboratory trial batch data shall be from within the previous 24 months.
 - 3. Cement: Certified mill reports, not older than 90 days.
 - 4. Supplementary cementitious materials: Source and test reports for actual material to be used in the Work, not older than 90 days.
 - a. Fly ash
 - b. Ground granulated blast-furnace slag
 - 5. Aggregate
 - a. Data not older than 90 days, except test data for soundness, abrasion, and alkali reactivity - not older than 1 year.
 - b. Fine and coarse aggregate data, except as noted

- 1) Sources
 - 2) Specific gravity
 - 3) Sieve analyses per ASTM C33 (including fineness modulus of fine aggregate)
 - 4) Organic impurities for fine aggregate per ASTM C40
 - 5) Potential alkali reactivity (not required if a cement containing less than 0.60 percent alkalis is used, per ASTM C33) per ASTM C1260, ASTM C1293, or ASTM C1567
 - 6) Soundness per ASTM C88
 - 7) Abrasion for coarse aggregate per ASTM C131 and ASTM C535
6. Product Data and Instructions
- a. Admixtures
7. Sample Batch Ticket
- a. Sample blank batch ticket from concrete batch plant
- B. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 SOURCE

- A. Provide concrete supplied from a single commercial ready-mix plant, mixed and delivered in accordance with the requirements of ASTM C94.

2.02 CONCRETE MATERIALS

- A. Concrete mixture design
1. Per ACI 301, Section 4, Concrete Mixtures.

2. 28-day design compressive strength: 4,000 pounds per square inch, except as otherwise specified.
3. Water to cementitious materials ratio: not to exceed 0.45 except as otherwise specified.
4. Provide designs of required strength, water to cementitious materials ratio, slump, and workability for placing conditions and specified finishes without segregation.
5. Slump
 - a. Per ASTM C143.
 - b. Specified Slump Range: 3 inches to 5 inches
 - c. Specified Slump Range (mixes with mid-range water reducer):
 - 1) 2 inches to 4 inches, before admixture is added
 - 2) Maximum 6 inches, after admixture is added
 - d. Specified Slump range (mixes with high-range water reducer)
 - 1) 2 inches to 4 inches, before admixture is added
 - 2) Maximum 8 inches, after admixture is added
- B. Cement: per ASTM C150, Type II or ASTM C595 IP(MS), IS (less than 70)(MS). Do not use ASTM C595 cements that contain ASTM C1157 cement. If equivalent alkali content is greater than 0.60 percent, submit aggregate reactivity testing as required by Article 2.02.D.3.
- C. Supplementary cementitious materials
 1. Fly ash (optional)
 - a. ASTM C618, Class F
 - b. Maximum loss of ignition: 3.0 percent
 - c. Not less than 15 percent or more than 25 percent of weight of cement plus fly ash
 2. Ground-granulated blast furnace (GGBF) slag (optional)
 - a. ASTM C989
 - b. Activity classification: Grade 100 or 120
 - c. Not less than 25 percent or more than 50 percent of weight of cementitious material
 3. Fly ash plus GGBF slag

- a. Maximum 50 percent of total cementitious materials
- b. Fly ash portion maximum 25 percent of total cementitious materials
- c. Minimum portland cement: 337 pounds per cubic yard of concrete

D. Aggregate

- 1. Meet ASTM C33, as amended herein. Evidence of a satisfactory service record in lieu of testing for alkali reactivity is not permitted.
- 2. Do not use crushed hydraulic cement concrete for aggregate.
- 3. Aggregate reactivity testing: per ASTM C1260. Do not use aggregate having a 14 day expansion greater than 0.10 percent (considered potentially reactive), except if tested per ASTM C1567, the 14 day expansion is not greater than 0.10 percent, or if tested per ASTM C1293, the 2-year expansion is not greater than 0.04 percent, or if cement containing less than 0.60 percent alkalis is used per ASTM C33.
- 4. Fine aggregates: Sand or screenings of gravel or crushed stone, well graded from fine to coarse; clean and free from soft particles, clay, loam and organic matter, with the volume removed by sedimentation not more than 3 percent.
 - a. Organic impurities testing: per ASTM C40. Color of the supernatant liquid above the test Sample, not darker than organic plate No. 3.
 - b. Grading

<u>U.S. Standard Sieve</u>	<u>Percent Passing</u>
Size 3/8 inch	100
No. 4	95 - 100
No. 8	80 - 100
No. 16	50 - 85
No. 30	25 - 60
No. 50	5 -30
No. 100	0-10

- c. Not more than 45 percent retained between any 2 consecutive sieves listed above. Fineness modulus, not less than 2.3 nor more than 3.1.

5. Coarse Aggregates: Crushed stone or washed gravel of clean, hard, durable, uncoated particles, free from dust, dirt, or other deleterious substances, and free from thin, flat, or elongated particles.
 - a. Nominal maximum aggregate size for slabs poured on ground, at least 15 inches thick, except where clear spacing between reinforcing bars is less than 2 inches: 1-1/2 inches.
 - b. Nominal maximum aggregate size at all other locations, except as specified otherwise or approved: 3/4 inch.
 - c. Nominal maximum aggregate sizes per grading in Table 2 of ASTM C33: No. 467 (1-1/2 inches), No. 57 (1 inch), No. 67 (3/4 inch), No. 7 (1/2 inch), and No. 8 (3/8 inch).

E. Admixtures

1. Air-entraining admixture
 - a. Per ASTM C260 and chloride free
 - b. Provide air entrainment, except as noted below, per manufacturer's directions and this Specification to produce the following total entrained air content determined per the procedure in ASTM C173 or ASTM C231.

Nominal Maximum Size Coarse Aggregate (inches)	Air Content By Volume (percent plus or minus 1.5)
3/8	7.5
1/2	7.0
3/4	6.0
1	6.0
1-1/2	5.5

- c. Maximum air content for interior concrete slabs to be hard-troweled: 3.0 percent.
2. Mid-range water reducing agents: per ASTM C494, Type A, and with consideration of the air entraining effect of the water reducing agent.
3. Water reducing-retarding agents: For use when ambient temperature above 70 degrees F, replace water reducing agent in whole or part with water reducing-retarding agent meeting ASTM C494, Type D. Use amounts to produce concrete with set time equal to that at 70 degrees F without the retarder.
4. Set accelerator: Non-chloride type conforming to ASTM C494, Type C or E where allowed under Section 03 30 20.

5. High-range water reducing agent: ASTM C494, Type F or G (added in plant or field).
- F. Water
1. Meet ASTM C1602.
 2. Fresh and free from oil, acid, salt, alkali, sewage, organic matter, and other deleterious substances.
 3. The amount of water carried on the aggregate and the effect of admixtures is included in the water content. Provide that water carried on the aggregate is determined periodically by test and the amount of free water on the aggregate subtracted from water added to the mixture.
 4. Residual, wash, or other water in drums: Completely discharged prior to concrete batching (drums backed out).
 5. Maximum amount of water required to produce a plastic mixture of the strength and water to cementitious materials ratio specified and the required density, uniformity and workability. Consistency of mixture required for the specific placing conditions and methods.
 6. Slump adjustment: Not made at wash down, slump rack, or by any other means prior to arrival at point of delivery at the Site.
 7. Water added after arrival at Site: Accurately metered and recorded on the batch ticket.

2.03 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.
- B. Advise testing laboratory and field observers minimum 24 hours in advance of placing concrete to allow for scheduling observation and testing.
- C. Assist testing laboratory and Engineer in obtaining and handling Samples at the Site and other sources of material.
- D. Provide space and electrical power at the Site for facilities to be provided by testing agency for proper initial curing and storage of concrete test cylinders to be lab-cured as required by ASTM C31 for 48 hours after casting. For cylinders to be field-cured: per Section 03 30 20.

- E. Testing agency to store cylinders to be lab-cured at 60 degrees F to 80 degrees F in an environment preventing moisture loss from the specimens such as storage in wooden boxes, and placement in damp sand pits. Shield specimens from direct sunlight and radiant heating devices. Control storage temperature by use of heating and cooling devices as necessary and record temperature with a maximum-minimum thermometer.

3.02 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

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SECTION 03 30 20

CONCRETE PLACING, CURING, AND FINISHING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide placing, curing and finishing of cast-in-place concrete accordance with this Section and applicable reference standards listed in Article 1.03.
2. Concrete sampling and field testing by an independent technician certified in accordance with the requirements of ACI Concrete Field Testing Technician – Grade 1 certification program, or the requirements of ASTM C1077. Paid for by Contractor.
3. Laboratory testing of concrete cylinders by an independent, accredited and certified testing laboratory. Paid for by Contractor.

B. Related Requirements

1. Section 03 11 00 – Concrete Forming
2. Section 03 30 00 – Cast-In-Place Concrete

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. American Concrete Institute International (ACI)
 - a. ACI 117 Specifications for Tolerances for Concrete Construction and Materials and Commentary
 - b. ACI 301 Specifications for Structural Concrete
 - c. ACI 306.1 Standard Specification for Cold Weather Concreting
 - d. ACI 308.1 Standard Specification for Curing Concrete
 - e. ACI 350.1 Specification for Tightness Testing of Environmental Engineering Concrete Containment Structures
 - f. ACI 306R Cold Weather Concreting
2. ASTM International (ASTM)

- a. ASTM C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field
- b. ASTM C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
- c. ASTM C42 Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
- d. ASTM C143 Standard Test Method for Slump of Hydraulic-Cement Concrete
- e. ASTM C144 Standard Specification for Aggregate for Masonry Mortar
- f. ASTM C171 Standard Specification for Sheet Materials for Curing Concrete
- g. ASTM C172 Standard Practice for Sampling Freshly Mixed Concrete
- h. ASTM C173 Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
- i. ASTM C231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
- j. ASTM C309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
- k. ASTM C404 Standard Specification for Aggregates for Masonry Grout
- l. ASTM C578 Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
- m. ASTM C881 Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
- n. ASTM C1064 Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
- o. ASTM C1077 Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation.
- p. ASTM C1315 Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete
- q. ASTM D2486 Standard Test Methods for Scrub Resistance of Wall Paints
- r. ASTM D4541 Standard Test Methods for Pull-Off Strength of Coatings Using Portable Adhesion Testers

- s. ASTM D4810 Standard Specification for Flexible Cellular Materials made from Polyolefin Plastics
- t. ASTM E1155 Standard Test Method for Determining Floor Flatness and Floor Levelness Numbers
- u. ASTM E1745 Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs

B. Definitions

- 1. Construction joint refers to a monolithic construction joint in which the surface between successive placements is prepared to enhance bond and shear transfer and reinforcement is continuous.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Product Data and Manufacturer's Instructions
 - 1. Delivery Tickets
 - a. Provide duplicate delivery tickets at time of delivery for each truckload of concrete delivered
 - b. Serial number of ticket
 - c. Date and Project location
 - d. Name and location of ready mixed concrete plant
 - e. Truck number, time loaded, cubic yardage delivered
 - f. Dispatcher's name
 - g. Mixture design, cement type, and admixtures with brand names
 - h. Types and quantities of cement, fly ash and/or slag (if included in approved mix design) and admixtures. Quantities of water and fine and coarse aggregate including moisture content, and nominal maximum aggregate size
 - i. Water added subsequent to plant batching, if any. (Only applicable if total water per mixture design is not added at plant. Addition of water such that the water content of the approved mixture design is exceeded will be strictly prohibited.)
 - j. Concrete temperature upon delivery

- k. Unloading time and location
- 2. Curing Paper
- 3. Epoxy Bonding Compound
- 4. Evaporation Retardant
- 5. Floor Hardener
- 6. Cure and Seal Compound
- 7. Curing Compound
- 8. Preformed Joint Filler
- C. Source and Field Quality Control Submittals
 - 1. Methods to be used to protect concrete placed during cold weather. The Engineer's review shall not constitute approval as the Contractor shall be responsible for the protection of concrete placed during cold weather.
 - 2. Methods to be used to protect concrete placed during hot weather. The Engineer's review shall not constitute approval as the Contractor shall be responsible for the protection of concrete placed during hot weather.
- D. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.
- B. Concrete sampling and testing per Article 3.11.
- C. Tightness Test Concrete Tanks per Article 3.12.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.
- B. Protection
 - 1. Provisions shall be made for maintaining new concrete in a continuously moist condition for at least seven days after placement
 - 2. Fresh concrete shall be protected from freezing, premature drying, flowing water, and mechanical injury

3. Concrete shall not be placed while rain, sleet, or snow is falling unless acceptable protection is provided. Precipitation shall not be allowed to enter into the concrete mix or damage concrete surfaces

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 PREFORMED JOINT FILLER

- A. Preformed joint filler: Conform to ASTM D4819, closed cell polyethylene foam isolation joint material, 1/2" thick unless noted otherwise on drawings. Joint filler shall be X-Tech by C2 Products, Inc., or approved equal.

2.02 CURE AND SEAL COMPOUND

- A. Water Based Cure and Seal Compound: Conform to ASTM C309, Type 1, and ASTM C1315, Type 1 with minimum 25 percent solids, non-yellowing, non-staining, and UV light resistant.
 1. MasterKure CC 1315WB, by Master Builders; Vocomp-25, by W.R. Meadows; Dress & Seal WB 25, by L&M Construction Chemicals, Inc.; or approved equal shall be provided.
 2. Approved Use: Water based products are preferred and approved for application to surfaces with a surface temperature above 50F for interior or exterior surfaces.
 3. Limitations: Not permitted for Cold weather application to surfaces temperatures less than 50F. Not permitted for surfaces to receive additional concrete fills, chemical hardeners, sealers, waterproofing, and architectural finishes such as concrete stain, paints and coatings, tile, carpet, and floor covering adhesives. Not permitted for surfaces to receive a sack-rubbed finish.
- B. Solvent Based Cure and Seal Compound: Conform to ASTM C309, Type 1, and ASTM C1315, Type 1 with minimum 25 percent solids, non-yellowing and non-staining, and UV light resistant.
 1. MasterKure CC 250 SB, by Master Builders; CS-309-25, by W.R. Meadows; Dress & Seal 30, by L&M Construction Chemicals, Inc.;
 2. Approved Use: Exterior surfaces with surface temperature above 40F.
 3. Limitations: Not permitted for surfaces with a surface temperature less than 40F. Not permitted for surfaces to receive additional concrete fills, chemical hardeners, sealers, waterproofing, and architectural finishes such

as concrete stain, paints and coatings, tile, carpet, and floor covering adhesives. Not permitted for surfaces to receive a sack-rubbed finish.

2.03 CURING COMPOUND

- A. Curing Compound: Conform to ASTM C309, Type 1, Class A.
 - 1. 1300 Clear, by W.R. Meadows; L&M Cure, by L&M Construction Chemicals, Inc.;
 - 2. Approved Use: Building wall footings, building foundation walls, exterior face of basement walls, and concrete sidewalks.
 - 3. Limitations: Not permitted for building interior surfaces; exterior concrete equipment pads; concrete tank structures.

2.04 DISSIPATING CURING COMPOUND

- A. Curing Compound: Conform to ASTM C309, Type 1, Class B resin based curing compound that will normally oxidize and begin to wear off in 30 to 60 days.
 - 1. 1100 Clear, by W.R. Meadows; L&M Cure W, by L&M Construction Chemicals, Inc.;
 - 2. Approved Use: Concrete sidewalks and building floor slabs to receive carpet, tile, and floor covering adhesives.

2.05 CURING PAPER

- A. Curing Paper: Shall consist of two layers of kraft paper cemented together and reinforced with fiber and conform to ASTM C171, for regular or white waterproof paper. Regular shall be used if ambient temperatures are below 60 degrees F.

2.06 EPOXY BONDING COMPOUND

- A. Epoxy Bonding Compound: Conform to ASTM C881, contain 100 percent solids, and be moisture tolerant. Sikadur 32 Hi-Mod or Sikadur 32 Hi-Mod LPL, by Sika Corporation; Sure-Bond (J-58, or J-58 LPL), by Dayton Superior; or approved equal shall be provided.
- B. Where larger placements require open times greater than 2 hours: Sika Armatec 110 EpoCem or approved equal for larger placements.

2.07 FLOOR HARDENER

- A. Floor Hardener: Clear potassium silicate solution that rapidly penetrates concrete surface without scrubbing and rinsing. Once absorbed, product shall react with the free lime and calcium hydroxide, producing a permanent chemical reaction that

hardens, densifies and tightens the concrete surface. StarSeal PS Clear, by Vexcon Chemicals, Inc, or approved equal.

B. Performance Requirements:

1. VOC: 0 grams/liter
2. Abrasive Scrub: ASTM D2486, minimum 1200 cycles
3. Bond Strength: ASTM D4541, greater than 50 psi
4. Percent Solids: Min 18%

C. Manufacturer's warranty: 20-years

2.08 EVAPORATION RETARDANT

- A. Evaporation Retardant: water based polymer liquid placed on fresh concrete to control the rate of evaporation and extend workability. E-CON as manufactured by L&M Construction Chemicals, Inc.; SikaFilm by Sika Corporation; MasterKure ER 50 by Master Builders; or approved equal.

2.09 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 CONCRETE PLACEMENT AND JOINTING

- A. Tolerances: Tolerances shall conform to all requirements of ACI 117 except as modified.
- B. Cold Weather Requirements
1. Cold weather concreting provisions shall be followed during cold weather: any and all periods when for more than three consecutive days the average daily outdoor temperature drops below 40 degrees F. (The average daily temperature is the average of the highest and lowest temperature during the period from midnight to midnight.) When temperatures higher than 50 degrees F occur during more than half of any 24-hour duration, the period shall not be regarded as cold weather.
 2. When freezing temperatures may occur during periods not defined as cold weather, concrete surfaces shall be protected against freezing for at least the first 24 hours after placing.
 3. Concrete shall not be placed on frozen subgrade. Insulate or heat subgrade to ensure temperature above 32 degrees F when concrete is placed.

4. All embedment's having a cross sectional area of 1.0 square inch or greater, and including #9 reinforcing bars, shall be at a temperature not less than 10 degrees F at time of concrete placement.
5. Thermal protection must be provided immediately after concrete placement. Procedures for covering, insulating, housing, and/or heating concrete shall be prearranged. Except when supplemental heat is provided, the R-value of the insulation shall be per the recommendations of chapter 9 of ACI 306R.
6. Accelerating admixtures shall be approved at the Engineer's discretion, however those containing calcium chloride shall not be permitted
7. When combustion heaters are used, flue gases shall be vented to the exterior of enclosures
8. Concrete shall be placed and maintained at the following minimum concrete placement temperatures (measured at concrete surface)
 - a. Sections of less than 12-inch minimum dimension: 55 degrees F
 - b. Sections of 12 to 36 inches minimum dimension: 50 degrees F
9. The concrete placement temperature shall not be higher than the minimum concrete placement temperature by more than 20 degrees F
10. The minimum concrete temperature as mixed shall be: 5 degrees F higher than the minimum concrete placement temperature when the air temperature is above 30 degrees F; 10 degrees F higher when the air temperature is between 0 and 30 degrees F; and 15 degrees F higher when the air temperature is less than 0 degrees F
11. The temperature shall be monitored at the surface of the concrete, including at corners and edges, which are more vulnerable to freezing. The concrete surface temperature and the corresponding outside air temperature shall be recorded a minimum of twice per each 24 hour period
12. Concrete shall be maintained at the minimum specified temperatures for a protection period of 6 days. When an approved accelerating admixture is used the protection period may be reduced to 4 days.
13. Slabs, regardless of air content, shall not be exposed to freezing temperatures when exposed to rain, snow or other water sources, prior to reaching a compressive strength of 3,500 psi. For hard-troweled slabs (which have a maximum air content of 3.0 percent) see Article 3.07, paragraph D.3 for additional requirements.
14. Concrete shall be cooled gradually at the end of the protection period. The maximum allowable temperature drop at the concrete surface during the

first 24 hours after the protection period shall be: 50 degrees F for concrete sections of less than 12 inch minimum dimension; and 40 degrees F for concrete sections of 12 to 36 inch minimum dimension.

C. Hot Weather Requirements

1. The temperature of the concrete when placed shall not exceed 90 degrees F. When the air temperature is 90 degrees F and above, procedures to cool mixture ingredients may be warranted. These include: providing shaded storage for aggregate, frequent sprinkling or fog spraying of coarse aggregate, and using chilled batch water and/or ice. Forms and reinforcement shall be sprinkled with cold water just prior to concrete placement. When possible, placement of slabs should be scheduled after walls and roof structure are in place in order to minimize problems associated with direct sunlight and/or drying winds. Newly placed concrete shall be protected from the direct sunlight.
2. Records shall be maintained of: time and location of concrete placement, air temperature, weather conditions (i.e. calm, windy, clear, and/or cloudy), relative humidity, and concrete temperature as delivered and after placement.
3. When the air temperature is 90 degrees F and above: the time between the addition of water to cement or cement to aggregate (whichever occurs first) and the time of concrete placement shall not exceed 60 minutes, except upon approval of the Engineer when all tests for air content, slump and temperature are acceptable.

D. Placing

1. Concrete shall be handled from the truck to the place of final deposit as rapidly as practicable by methods preventing segregation and/or loss of ingredients.
2. The time between the addition of water to cement, or cement to aggregates (whichever occurs first), and the placement of concrete shall not exceed 90 minutes. When air temperature is 90 degrees F and above, this time shall be reduced to 60 minutes. These times may be exceeded only upon approval of the Engineer, and only if all tests for air content, slump, and temperature are also acceptable.
3. Water shall be removed from all forms and excavations and the Work shall be kept dry during placement. No water shall be thrown on, allowed to flow over, or rise upon the concrete until it is thoroughly set.
4. Prior to placement of slabs on soil, the subgrade shall be moist with no free water and no muddy or soft spots.

5. The concrete shall be directly deposited as close as possible to its final location, and shall be deposited in such manner so as to maintain a homogeneous, plastic, approximately horizontal surface.
 6. Where concrete may contact soil while being placed, free fall shall be limited to a maximum of 3 feet. Concrete that has been contaminated by soil and/or other foreign matter shall be rejected. The accumulation of concrete on the forms and/or on reinforcement above the level of placement shall be avoided. The splashing of concrete upon formwork that is set for a subsequent concrete placement shall be prevented due to the resulting marks on the finished concrete.
 7. Re-tempering of concrete and concrete placement against partially hardened concrete shall not be permitted. A concrete placement, once started, shall be carried out as a continuous operation until the placement of the entire section between construction joints is complete.
- E. Runways: Runways shall be provided for wheeled concrete handling equipment which shall not be wheeled over reinforcement. Runways shall not be supported upon reinforcement that is part of the Work.
- F. Chuting
1. Minimum slope shall be 3 horizontal to 1 vertical and maximum slope shall be 2 horizontal to 1 vertical. Between these limits, the slope shall be that which will prevent segregation and ensure continuous flow.
 2. A baffle shall be provided at the end of the chute to prevent segregation. If the end of the chute is more than 3 feet above the surface of deposit, a spout shall be used. The spout shall be kept full of concrete with the end kept as near as practical to the surface of deposit.
 3. The chute shall be steel or steel lined, and sections shall have the same slope throughout. Aluminum chutes are not permitted.
 4. The chute shall be thoroughly flushed with water before and after each use, the water discharged outside the forms.
- G. Pumping: The inside diameter of pipes and hoses used to convey the concrete shall be a minimum of three times the maximum size aggregate of the mixture. In order to minimize altering the concrete properties, long vertical sections at the end of the pump line shall be avoided. A horizontal hose run, a hose loop, or a slide gate at the end of the hose may be used to reduce loss of entrained air.
- H. Compaction
1. Provide at least one standby vibrator, and at least one for each three in use.

2. Concrete may be deposited in one or multiple layers. Each layer shall be compacted by mechanical internal vibrating equipment supplemented by hand spading, rodding, and tamping as required. The depth of each layer shall not exceed the smaller of 36 inches and the depth that can be properly vibrated with the equipment used. When deposited in multiple layers, the vibrator shall penetrate the previous layer approximately 6 inches. Ensure initial setting of the previous layer does not occur prior to placement of subsequent layer.
3. Vibrators shall be relocated frequently, and over-vibration resulting in segregation shall be prevented. Vibrators shall not be used to move concrete within the forms. Concrete shall be thoroughly consolidated around reinforcement, embedments, and into the corners of the forms.
4. Ensure that vibrator is kept several inches clear of waterstops.
5. Where internal vibration is impractical, the use of form vibrators will be considered, and will be allowed only with the Engineer's written approval. When allowed, the vibrator shall be placed so that motion is horizontal

I. Construction Joints

1. Construction joints shall be located where shown on the Drawings, or, if not shown, locations shall be approved by the Engineer. Where required to be watertight, waterstops as specified in Section 03 11 00 shall be used.
2. Horizontal construction joints: laitance shall be removed immediately after initial set and the surface shall be roughened in an acceptable manner that exposes the aggregate uniformly and doesn't leave laitance or loose aggregate. After the concrete has set to a degree that precludes laitance removal by shovels or scrapers, the Contractor shall remove it, and create a roughened surface, by water jetting or other effective method. The use of pneumatic hammers is not permitted.
3. Vertical construction joints: the surface shall be thoroughly cleaned of laitance by water jetting, or by wire brushing followed by air blasting.
4. Before concrete is placed against set concrete, the surface shall be thoroughly wetted with standing water removed. Horizontal construction joints shall be in a saturated surface dry condition: saturated for a minimum of 6 hours, with standing water removed.
5. Where noted on the Drawings, and as approved by the Engineer where an unplanned interruption within a concrete placement has occurred, epoxy-bonding compound shall be used in accordance with the manufacturer's instructions.

6. Reinforcement shall be continuous at construction joints unless otherwise shown on the Drawings. Waterstops shall be provided where called for in the Contract Documents. All necessary precautions to ensure that the waterstop is properly located and aligned and remains so during concrete placement shall be taken. In the event that the waterstop is improperly located, allowing a tolerance of plus or minus 1/2-inch, the Engineer may order the waterstop extended, or replaced, or such other action as deemed necessary, and at no additional cost to the Owner.

J. Concrete Fills

1. New unformed concrete surfaces upon which concrete is placed shall receive a rough (broom, scratched, rough screed, or rough wood float) finish.

K. Existing Concrete

1. Where concrete is placed against existing concrete, the following surface preparation shall be required.
2. The existing concrete surface shall be cleaned of all contamination and debris, and roughened by steel shot blasting, abrasive (sand) blasting, or water jetting (hydrodemolition). Use of scabblers, scarifiers, bush hammers, or pneumatic hammers is not permitted.
3. The existing concrete surface shall be water-saturated for a minimum of six hours, after which the excess water shall be removed immediately prior to placement of new concrete.
4. Apply epoxy-bonding compound to prepared concrete surface prior to concrete placement.

3.02 CURING AND PROTECTION

A. Temperature

1. When the ambient temperature falls below 40 degrees F or rises above 95 degrees F, a record shall be kept of concrete temperatures and of protection given to concrete during placement and curing.
2. The temperature of in-place concrete shall be the surface temperature of the concrete. The surface temperature may be determined by placing temperature sensors in contact with concrete surfaces or between concrete surfaces and covers used for curing, such as insulation blankets or plastic sheeting.

B. Curing

1. Provide curing per ACI 308.1 except as modified.
2. During cold weather, as previously defined, the application of water shall not be required. Curing shall be accomplished by the use of curing paper, curing compounds, cure and seal compounds, or other approved methods. Thermal blankets are not an approved curing method and shall be used in conjunction with curing provisions previously stated.
3. Provisions shall be made for maintaining new concrete in a continuously moist condition for a minimum of 7 days. Curing shall commence as soon as possible after final finishing when it will not mar, erode, or stain the concrete surface.
4. Curing shall be accomplished by the use of curing paper, curing compounds (except as noted below), wet methods (ponding, fog spray, damp sand or burlap, sprinkling, soaker hoses) or other methods.
5. Water used for curing shall be no more than 20 degrees F cooler than the concrete surface temperature.
6. Concrete slabs to receive a coating or bonded finish, including chemical hardeners, that aren't wet cured, shall be covered with curing paper as specified, laid with side joints lapped 4 inches and end joints lapped 6 inches. Paper shall be applied no earlier than 24 hours and no later than 30 hours after finishing the slab and shall be left in place at least seven days. (Wet methods shall be used for the first 24-30 hours.) The slab surface shall be maintained in a wet condition beneath the paper at all times. Joints shall be taped and paper shall be weighted to prevent displacement. Tears during the first 7 days after a slab is completed shall be immediately repaired.
7. Curing paper shall also be used to protect newly poured concrete floors from damage. Where heavy tools and/or equipment may be used, provide additional protection as required. Only light traffic will be permitted until 7 days after concrete placement. Slabs shall be protected from damage for the Contract duration, with any and all damage repaired by the Contractor at no additional cost to the Owner.
8. The use of a curing compound or cure and seal compound on surfaces to receive applied toppings, chemical hardeners, water repellents, coatings, or a rubbed or bonded finish will not be allowed. Where used, curing compound shall be applied immediately following the disappearance of the surface water sheen after the final finishing pass for slabs, and immediately upon removal of forms for formed concrete. Apply two coats per manufacturer's installation instructions. Apply each coat uniformly with no gaps in coverage. If applied by spray, provide additional spray tank and spray nozzles as required to provide uninterrupted application of product. Cure and seal compounds have high solid content and shall be

applied by trays and rollers, if application by spray tanks is not completed in a timely manner and to the satisfaction of the engineer.

9. Soaker hoses shall be used at tops of walls and columns before forms are removed. Wood forms shall be kept continuously wet in hot weather.

3.03 DEFECTIVE CONCRETE

- A. The Engineer may direct the Contractor to remove and replace, at no additional cost to the Owner, concrete Work that is not formed as shown and/or specified in the Contract Documents, or that contains a defective surface.
- B. Upon the Engineer's approval, minor imperfections may be patched as specified herein.

3.04 REPAIR OF SURFACE DEFECTS AND PATCHING

- A. After form removal, all form ties shall be cut off, all fins and irregularities removed, and all defective areas, holes, honeycombs, cavities and irregularities shall be repaired where surface finish defects exceed the finish tolerances of Section 3.05
- B. Exposed patchwork shall match adjacent finish and shall include a sack rubbed finish to blend repair into adjacent surfaces, and cured and protected as specified for concrete.
- C. Filling Form Tie Holes: Tie holes shall be filled solid with non-shrink grout in the same manner as specified under patching above.

3.05 FINISH OF FORMED SURFACES

- A. General
 1. Concrete surfaces "exposed to view" shall be defined as those exposed to view upon completion of the Work, whether or not a painted finish is specified. Surfaces which will be covered by fill, such as exterior faces of walls, shall not be considered exposed to view.
 2. Surface tolerance classes indicated herein are specified in ACI 117, and include abrupt surface irregularities that are measured within 1-inch of the irregularity, and gradual surface irregularities measured as the maximum gap between the concrete and the near surface of a 5-foot straight-edge, measured between contact points.
- B. Surface Finish – 3.0 (SF3.0)
 1. SF-3.0 shall be provided for formed surfaces exposed to view, and for concrete not containing liquids, and/or gases.

2. Patch voids larger than 1/2-inch wide or 1/4-inch deep. For surfaces to receive waterproofing, patch all voids per the waterproofing manufacturer's written installation instructions.
3. Remove projections larger than 1/8-inch. For surfaces to receive waterproofing, remove all projections per the waterproofing manufacturer's written installation instructions.
4. Fill tie holes
5. Surface tolerance Class C, with formed surface irregularities not more than 1/2-inch.

C. Grout-cleaned rubbed finish (Sack-Rubbed)

1. All interior and exterior concrete surfaces that are exposed to view shall receive a grout-cleaned rubbed finish and shall have a smooth and even surface, free of bug holes, when completed, unless specifically noted otherwise on drawings.
2. Wet the surface and apply a thin coat of medium consistency neat cement slurry to the concrete surface by means of bristle brushes to provide a bonding coat. Before the slurry has dried or changed color, grout comprising one part cement to 1 1/2 parts sand meeting ASTM C144 or ASTM C404, with sufficient water to produce the consistency of thick paint, shall be applied and scrubbed into voids, with excess removed. The cement shall be that used in the concrete mix adjusted with white cement as necessary to match color of exposed concrete. Grout shall be applied with slightly damp pads of coarse burlap approximately 6 inches square used as a float and shall be well scrubbed into the surface to provide a dense mortar.
3. The mortar shall be allowed to partially harden for 1 to 2 hours depending upon weather conditions. Work in direct hot sunlight shall be avoided. In hot dry conditions the concrete shall be kept damp during this period with a fine fog spray. Grout shall not be allowed to remain on the surface too long as it will become very difficult to remove. Grout shall not be left on the concrete overnight.
4. After the grout has hardened sufficiently, all that can be removed with a trowel shall be.
5. The surface shall then be allowed to dry thoroughly, and be rubbed vigorously with clean, dry burlap to completely remove any dried grout. There should be no visible film of grout remaining after rubbing.
6. The entire rubbing operation shall be completed in a single working day. Sufficient time shall be allowed for this.

7. On the following day, the concrete shall again be wiped clean with dry burlap to remove dust. The use of burlap containing old hardened mortar may be used since it will act as a mild abrasive. After this treatment, no build-up film should remain on the surface, but if it does, a fine abrasive stone shall be used to remove it without breaking through the surface film of the parent concrete. Do not work up a lather.
8. After application of the surface grout, the surface shall be thoroughly washed down with stiff brushes and the concrete maintained in a continuously damp condition for at least three days above 50 degrees F by the periodic application of a fine fog spray, the use of damp fabric covered with polyethylene or other methods.

3.06 FINISHING OF RELATED UNFORMED SURFACES

- A. Tops of exposed walls and similar unformed surfaces shall be struck off smooth and hand steel troweled to produce a smooth hard level surface. Line and elevation shall be pre-established by means of preset wood screeds, which shall be removed during the troweling operation.
- B. After troweling is completed and after the curing period, the surface shall be dry honed to a smooth non-directional surface texture satisfactory to the Engineer.

3.07 FINISH OF SLABS

- A. General
 1. Where a dry shake application of cementitious waterproofing is applied, it shall be incorporated into the finishing operation.
 2. The evaporation retardant specified may be used in accordance with manufacturer recommendations to control plastic shrinkage cracking and as an aid in slab finishing operations. Conditions that may warrant its use include: high temperature, low humidity, high winds, and direct sunlight.
 3. Loss of bleed water and surface drying shall be allowed to proceed naturally. Means to accelerate drying such as applying dry cement, sand, or other materials shall be prohibited.
- B. Floor Flatness and Floor Levelness
 1. Elevated floor slabs constructed on formwork and all concrete tank base slabs shall be true to the gradient and elevation shown on the Drawings. Flat Slabs shall be level with a tolerance of 1/8 inch in 10 feet. Sloped slabs shall be true to the gradient shown, within a tolerance of 1/8 inch in 10 feet. Slabs shall be pitched to drains as indicated on the Drawings.
- C. Floated Finish

1. Slabs to receive a seamless floor finish or roofing, and all tank bottom slabs, shall receive a floated finish. Floating shall also precede a troweling, where a troweled finish is required as specified below. After consolidating, screeding, and leveling, the slab shall not be worked further until it is ready for floating.
2. Floating shall begin when the water sheen has disappeared, and when the slab has stiffened sufficiently to allow proper operation of a power-driven float. Hand floating with wood, aluminum or magnesium floats shall be used at locations inaccessible to the power-driven float.
3. Surface trueness shall be verified at this stage with a 10-foot straightedge applied in multiple angles. High spots shall be cut down and low spots filled so that the finished surface is true. The slab shall then be immediately refloated to a uniform, smooth, granular texture.

D. Troweled Finish

1. All interior slabs left exposed shall receive a troweled finish.
2. The surface shall be finished with power floats as specified above for floated finish, followed by power trowels, and finally hand trowels. The first power troweling shall produce a smooth surface relatively free of defects but which may contain trowel marks. Subsequent trowel shall be by hand after the surface has sufficiently hardened. The surface shall be thoroughly consolidated by the hand troweling, and final troweling shall be done when a ringing sound is produced as the trowel is moved over the surface. The finished surface shall be free of trowel marks and uniform in texture and appearance.
3. Interior concrete slabs to be hard-troweled shall have a maximum air content of 3.0 percent. After the curing period, they shall be protected from freezing temperatures for a minimum of 8 weeks. Thereafter, and for the duration of the Contract, if such slabs might be subject to freezing temperatures, they shall be fully sheltered from rain, snow and all other water sources.
4. Subsequent trowels shall be by hand after the surface has sufficiently hardened. The surface shall be thoroughly consolidated by the hand troweling, and final troweling shall be done when a ringing sound is produced as the trowel is moved over the surface. The finished surface shall be free of trowel marks and uniform in texture and appearance.

- E. A broom finish shall be provided for all exterior slabs, sidewalks, platforms, ramps, exterior stairs and as specified herein or shown on the Drawings. After floating, and between initial and final set, the surface shall be given a coarse transverse scored texture by drawing a broom across the surface.

- F. Raked finish: after consolidating, screeding and leveling, the surface shall be roughened with stiff brushes or raked before final set. At sloped surfaces scratches shall be made parallel to the direction of slope, to facilitate subsequent cleaning.
- G. A wood float finish, a broom finish with open pores, or a finish as otherwise required by the waterproofing manufacturer shall be provided for concrete slabs that will receive a wet slurry application of cementitious waterproofing.

3.08 FLOOR HARDENER

- A. Floor hardener shall be applied for exposed interior concrete building floor slabs. It shall be applied at a coverage rate recommended by the manufacturer. It shall be applied per the manufacturer's specifications after curing. Slabs to receive hardener shall be wet cured or cured using curing paper.

3.09 CLEANING CONCRETE

- A. Cleaning during progress of the Work shall not be permitted. Cleaning shall not commence until the structure is entirely completed.
- B. Rust and other stains and discolorations shall be removed with a non-etching cleaning agent used in accordance with the manufacturer's instructions. Cleaning of all surfaces to receive a painted finish is also required.
- C. Rust stains may be removed by applying a bleaching agent such as oxalic acid. Acid etching, sandblasting, or cleaning by other methods may be used as approved by the Engineer.

3.10 FIELD QUALITY CONTROL

- A. General:
 - 1. Provide in accordance with Division 01 General Requirements.
 - 2. During the progress of the Work, an independent, accredited and certified testing laboratory shall conduct concrete testing as specified herein, including the preparation and testing of concrete cylinders. All testing shall be paid for by the Contractor.
 - 3. Field technicians in charge of sampling concrete; testing for slump, unit weight, air content, and temperature; and making and curing test specimens shall be certified in accordance with the requirements of ACI Concrete Field Testing Technician – Grade 1 certification program, or the requirements of ASTM C1077.

4. Scheduling: Contractor to advise testing laboratory and field technician(s) a minimum 24 hours in advance of placing concrete to allow for scheduling observation and testing.
5. Test Cylinder Storage: Provide space and electrical power at the Site for temperature controlled storage of concrete laboratory test cylinders to be standard cured per Specification 03 30 00. Temperature controlled storage containers to be provided by testing agency.

B. Field Testing and Sampling Procedures

1. Concrete samples shall be taken in accordance with ASTM C172 for slump, entrained air, unit weight, and strength tests.
2. Entrained air content and slump requirements are listed in Specification 03 30 00.
3. Air Content: Test in accordance with ASTM C173 or ASTM C231. Prior to pumping initial delivery of concrete each day, air content and slump shall be verify at point of delivery. Thereafter, pumped concrete shall be sampled and tested for air content at the point of placement, as opposed to at the point of delivery. Upon the Engineer's approval: once the slump loss and the loss of entrained air due to pumping is established, correlated acceptance limits at the point of delivery, where sampling and testing may then be performed, shall be made applicable. When the pump line configuration is changed significantly, sampling and testing shall again be performed at the point of placement until new acceptance limits at the point of delivery may be determined.
4. Slump: Measured in accordance with ASTM C143 at the point of delivery.
5. Temperature shall be measured in accordance with ASTM C1064 at the point of delivery
6. Test Cylinders: Concrete cylinders shall be prepared in accordance with ASTM C31 and be 4 inches diameter by 8 inches tall. Refer to Article 3.11, part D for number of cylinders required.
 - a. Lab-Cured (Standard Cured) Cylinders: Filed cured in temperature controlled storage per Specification 03 30 00. Cylinders shall be transported to the testing lab within 48 hours of forming, but not sooner than 8 hours after final set.
 - b. Field Cured Cylinders: Cured in the field under conditions that are not more favorable than the most unfavorable conditions for the portions of the concrete that the tcylinders represent.

C. Laboratory Testing of Test Cylinders:

1. Cylinders shall be tested for compressive strength in accordance with ASTM C39
2. Test concrete cylinders per Section 3.11, Part D.
3. The compressive strength shall be the average strength of three cylinder breaks per ASTM C39 and tested at 28-days.
4. Test Results: Submit test results to Engineer and concrete supplier within 24 hours of laboratory testing.

D. Field and Laboratory Testing Frequency:

1. Minimum field testing frequency for each day concrete is delivered and placed at the project site shall be as follows.
 - a. Take concrete test cylinders at frequency stated herein from truckload determined by technician, contractor, or engineer
 - b. 1st truck load: Test air content, slump, and temperature.
 - c. 2nd and 3rd truck load: No testing unless noted otherwise.
 - d. 4th truck load: Test air content, slump, and temperature
 - e. 5th and 6th truck load: No testing unless noted otherwise
 - f. 7th truck load: Test air content, slump, and temperature.
 - g. Repeat test frequency for additional truckloads of concrete delivered during each day of concrete placement.
 - h. Concrete temperature shall be tested for each truckload of concrete during cold weather or hot weather as defined within this specification.
 - i. Contractor, Owner's representative, or Engineer shall increase testing frequency as required to verify mix designs, address workability concerns, and to ensure all concrete placed complies with specifications
2. Lab-Cured (Standard Cure) Cylinders:
 - a. Lab-cured cylinders are required for all concrete on the project, and shall be in addition to field-cured cylinders, where provided.
 - b. One set of 5 cylinders shall be prepared for each 100 cubic yards, or fraction thereof, of each different mix placed in each single day; or for each 5,000 square foot of slab or wall surface area placed each day.
 - c. Test one cylinder at 7 days, three at 28 days, and reserve one cylinder for 56-days.

- d. Test 56-day cylinder as needed or requested by Contractor or Engineer.
- 3. Field-Cured Cylinders:
 - a. Contractor is responsible for taking additional field-cured test cylinders to verify concrete compressive strength prior to tightness testing concrete tanks, backfilling concrete basement walls, or early removal of formwork.
 - b. One set of 3 field-cured cylinders shall be prepared for each 100 cubic yards, or fraction thereof, of the concrete placed in each single day.
 - c. Test field cured cylinders at 14 days or as requested by Contractor or Engineer.
- E. Acceptance Criteria and Additional Testing Requirements:
 - 1. Concrete strength shall be evaluated in accordance with ACI 301 Section 1.6.5, "Evaluation of concrete strength tests", and Section 1.6.6, "Acceptance of concrete strength"
 - 2. Construction will be considered potentially deficient if concrete fails to meet any requirements that affect the strength and durability of the structure, including but not necessarily limited to
 - a. Low strength concrete per ACI 301, Section 1.6.5, "Evaluation of concrete strength tests", and Section 1.6.6, "Acceptance of concrete strength"
 - b. Water-to-cementitious materials ratio higher than that of the specified mix
 - c. Reinforcing steel size, quantity, strength, position or arrangement that does not meet the requirements of the Contract Documents
 - d. Reinforced concrete that differs from the dimensions or locations shown on the Drawings
 - e. Curing that does not meet the requirements of the Contract Documents, including premature formwork removal
 - f. Hot or cold weather concreting that doesn't meet the requirements of the Contract Documents
 - g. Mechanical damage from accidents or fire
 - h. Poor construction practices
- F. The Engineer may order load and/or core tests in accordance with ASTM C42. Such testing shall be paid for by the Owner if the concrete is proven to meet the requirements specified.

3.11 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.
- B. Submit signed and completed concrete tank tightness testing forms for each tank basin required to be tested.

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide the following metal fabrications in accordance with this Section and applicable reference standards listed in Article 1.03.
 - a. Railings and components including mounting brackets
 - b. Guard chains
 - c. Frames for miscellaneous openings
 - d. Miscellaneous steel items
 - e. Anchor bolts
 - f. Expansion Bolts
 - g. Adhesive Anchors
 - h. Steel bollards
 - i. Roof Panels
 - j. Embedded metal items not receiving structural steel
 - k. Equipment supports not attached to structural steel
2. Epoxy adhesive for installing drilled and epoxy rebar is specified in Section 03 16 00.

B. Related Requirements

1. Section 03 11 00 – Concrete Forming
2. Section 03 16 00 – Concrete Specialties
3. Section 09 90 00 – Painting and Coating

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards

1. American Concrete Institute (ACI)
 - a. ACI 355.2 Qualification of Post-Installed Mechanical Anchors in Concrete
 - b. ACI 355.4 Qualification of Post-Installed Adhesive Anchors in Concrete Elements
2. American Institute of Steel Construction (AISC)
 - a. AISC 303 Code of Standard Practice for Steel Buildings and Bridges
3. American National Standards Institute (ANSI)
 - a. A14.3 American National Standard for Ladders-Fixed-Safety Requirements
4. American Welding Society (AWS)
 - a. AWS D1.1 Structural Welding Code - Steel
 - b. AWS D1.2 Structural Welding Code - Aluminum
 - c. AWS D1.6 Structural Welding Code - Stainless Steel
5. ASTM International (ASTM)
 - a. ASTM A6 Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
 - b. ASTM A36 Standard Specification for Carbon Structural Steel
 - c. ASTM A53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
 - d. ASTM A123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - e. ASTM A153 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 - f. ASTM A239 Standard Practice for Locating the Thinnest Spot in a Zinc (Galvanized) Coating on Iron or Steel Articles
 - g. ASTM A500 Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
 - h. ASTM A563 Standard Specification for Carbon and Alloy Steel Nuts
 - i. ASTM A572 Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel

- j. ASTM A653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - k. ASTM A780 Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
 - l. ASTM A992 Standard Specification for Structural Steel Shapes
 - m. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
 - n. ASTM B211 Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire
 - o. ASTM B308 Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles
 - p. ASTM D6386 Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting
 - q. ASTM F436 Hardened Steel Washers
 - r. ASTM F959 Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners
 - s. ASTM F1136 Standard Specification for Zinc/Aluminum Corrosion Protective Coatings for Fasteners
 - t. ASTM F1554 Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
 - u. ASTM F1852 Standard Specification for "Twist Off" Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
 - v. ASTM F2329 Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners
 - w. ASTM F2833 Standard Specification for Corrosion Protective Fastener Coatings with Zinc Rich Base Coat and Aluminum Organic/Inorganic Type
 - x. ASTM F3125 Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi and 150 ksi Minimum Tensile Strength, Inch and Metric Dimensions
6. ICC Evaluation Services (ICC-ES)
- a. ICC-ES AC58 Acceptance Criteria for Adhesive Anchors in Masonry Elements.
 - b. ICC-ES AC308 Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements.

7. National Association of Architectural Metal Manufacturers (NAAMM)
 - a. AMP 500 Metal Finishes Manual
 - b. MBG 531 Metal Bar Grating Manual
 - c. MBG 533 Welding Specification for Fabrication of Steel, Aluminum, & Stainless Steel Bar Grating
8. Research Council on Structural Connections (RCSC)
 - a. Specification for Structural Joints Using High-Strength Bolts

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Shop Drawings
 1. Details of connections, copes, splices, holes, hardware, finish, and other pertinent information
 2. Anchor bolt embedment Drawings
 3. Indicate welds by standard AWS symbol
 4. Indicate bolts and identify slip-critical connections as applicable
 5. Identify areas of slip-critical connections to be masked from shop painting
- C. Product Data
 1. Expansion Bolts
 - a. ICC-ES Compliance Report
 - b. Allowable and ultimate load tables per embedment depths
 - c. Capacity reduction factors for bolt spacing and edge distances
 - d. Installation Instructions including bolt torque
 2. Adhesive Anchors
 - a. ICC-ES Compliance Report
 - b. Allowable and ultimate load tables per embedment depths
 - c. Storage requirements

- d. Gel and cure times as a function of temperature
 - e. Installation temperature requirements
 - f. Drilling method (diamond drill bit shall be prohibited)
 - g. Drill bit diameter and depth of hole for each size anchor
 - h. Hole cleaning procedure and required condition of hole
 - i. Dual-nozzle instructions to ensure proper mixing
 - j. Hole Filling procedure
 - k. Time period anchor cannot be contacted or disturbed
- D. Manufacturer Instructions
- E. Source and Field Quality Control Submittals
- F. Certificates
 - 1. Mill test reports for structural shapes, bolts, nuts, and washers
 - 2. Welding certifications for welding procedures and personnel
- G. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.
- B. Assemble and ship ASTM F1852 and galvanized ASTM F3125 bolt assemblies in the same container. Do not re-lubricate ASTM F1852 tension-control bolt assemblies.
- C. Carefully unload material and equipment and stack to prevent deformation and damage. Store items on substantial pallets, dunnage, or other supports and spacers, free from the earth and properly drained, preventing splattering with dirt and other foreign matter.
- D. Store material and equipment to permit easy access for inspection and identification. Protect from deterioration and maintain markings.
- E. Provide protective storage for fastener components. Protect fastener components removed from protective storage from dirt and moisture in closed containers at the location of installation. Do not clean or modify fastener components from as-

delivered condition. Do not use fastener components accumulating rust or dirt and remove from the Site.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Make field measurements prior to fabrication to ensure proper fit. Report discrepancies in existing conditions that require detail changes to Engineer prior to fabrication.
- B. Assemble built-up Work in sections in the shop as much as practicable and match mark components for field assembly.
- C. Bolt holes (including those for attaching wood blocking and other components): by fabricator and not made or modified by burning.
- D. Gauges
 - 1. For iron sheets and steel: U.S. Standard
 - 2. For non-ferrous products: Brown & Sharpe
 - 3. For wire: United States Steel Wire
- E. Weld carbon steel per ANSI/AWS D1.1, with electrodes with a tensile strength of 70 ksi.
- F. Fusion weld aluminum by the inert gas-shielded arc method per ANSI/AWS D1.2. Use alloy rods similar to alloy being welded where appearance match is required. Alloy 4043 rods may be used where appearance is not a factor and anodizing is not required.
- G. Weld stainless steel per AWS D1.6
- H. Steel
 - 1. Comply with AISC 303
 - 2. Steel mill material tolerances: per ASTM A6
 - 3. Steel W-shapes: ASTM A992 (50 ksi yield strength)
 - 4. Steel channels and angles: ASTM A992 (50 ksi yield strength) ASTM A572 grade 50, or ASTM A36

5. Other steel shapes, plates and bars: ASTM A36
6. Steel pipe: ASTM A53, Grade B
7. Hollow structural shapes: ASTM A500, Grade B.
- I. Bolts: ASTM F3125 Grade A325 Type I, heavy-hex, hot-dipped galvanized per ASTM F2329 at exterior applications and/or where indicated on Drawings
- J. Nuts: ASTM A563, heavy-hex
- K. Washers: ASTM F436 hardened steel
- L. Tension-control bolt assemblies: ASTM F1852 Type I, heavy-hex
- M. Direct tension indicators: ASTM F959, Type 325, compressible washer type
- N. Threaded rods: ASTM A36
- O. Aluminum items: Fabricated from bars, plates, pipes, rolled and extruded shapes conforming to the following alloy designation unless otherwise specified.
 1. Standard structural shapes: Rolled 6061-T6 per ASTM B308
 2. Rolled rod and bar: 6061-T6 per ASTM B211
 3. Sheets, Plates, Checkered Plates: 6061-T6 per ASTM B209
 4. Bolts: 2024-T4
 5. Nuts: 6061-T6
 6. Washers: Alclad 2024-T4
- P. Stainless steel items: Type 316 (Type 316L if welded)

2.02 STEEL RAILING

- A. Steel railing: 1-1/2 inch round steel pipe in all welded construction.
- B. Furnish railing in the largest practical sections with the locations and details of field connections indicated on Shop Drawings. Close exposed ends of railing members.
- C. Welds: Continuous at intersections and ground smooth on all exposed areas. Use radius corners only, do not use mitered corners. Where intersections occur, shape and cut pieces to fit with no distortion of the circular shape.
- D. Posts

1. Schedule 40, single, un-spliced pipe length
2. Spacing: Maximum 6-feet on center measured along the rail
- E. Rails
 1. Schedule 40
 2. Top rails
 - a. Continuous wherever possible with single un-spliced length attached to minimum of 3 posts.
 - b. At platforms and other level runs: 42 inches from the top of rail to floor, tank wall or another horizontal surface unless otherwise specified.
 - c. On stair flights: 42 vertical inches from the top of rail to a line connecting the toes of the treads.
 3. Lower rails
 - a. Single un-spliced length between posts
 - b. At level runs and at stairs: approximately half the height of the top rail.
- F. Toeboard: 4-inches high, 1/4-inch-thick, connected to posts except where specifically shown to be omitted on the Drawings.
- G. Provide expansion joints at each railing and toe plate, allowing 1/2 inch of joint movement at each location and space at intervals of maximum 24 feet. Provide internal slip sleeve fastened securely to one side and extend a minimum of 2 inches beyond each side of the joint. Locate within 6 inches of posts.
- H. On stairs: Provide additional (third) rail forming a handrail, bracketed off the vertical posts at a height of 34 inches from the upper surface to a line connecting the toes of the treads. Provide 3-inch minimum clearance from posts and obstructions.
- I. Completed railing structure and anchorage: Capable of withstanding the loads prescribed by the building code of Project location.
- J. Support wall mounted railing with cast brackets and fasten with stainless steel expansion or toggle bolts.
- K. Furnish removable railings where indicated on the Drawings, mounted so that when the railing is removed, it is separated from the mounting bracket.
- L. Hot-dip galvanized steel railing per ASTM A123 after fabrication.

2.03 STEEL GUARD CHAIN

- A. Manufacturers: Lawrence Metal Products, Inc., American Chain & Cable Co., Turner & Seymour Manufacturing Company, or equal.
- B. Material: 3/16-inch diameter stainless steel wire with welded links, 13 links per foot. Permanently fasten each chain at one end and provide with swivel snap hook to attach to the other end.
- C. Provide in lengths sufficient to span openings with a minimal amount of slack.

2.04 STEEL FRAMES FOR MISCELLANEOUS OPENINGS

- A. Fabricate from structural shapes and plates in sizes per Drawings.
- B. Accurately square, miter, butt, or cope frames. Weld flush and grind smooth.
- C. Stops: Plug-welded and ground smooth.
- D. Seal weld joints exposed to weather.

2.05 EXPANSION BOLTS (INTO CONCRETE)

- A. General: Torque controlled expansion anchor suitable for seismic loads and cracked concrete applications.
- B. Material:
 - 1. AISI 316 stainless steel anchor body, nut, washer, and expansion sleeve, unless noted otherwise
- C. Evaluation Requirements: ICC-ES evaluation report stating product is compliant with 2015 International Building Code and approved for use to resist static, wind and earthquake (Seismic Design Categories A through F) tension and shear loads in cracked and uncracked normal-weight concrete having a compressive strength of 2,500 psi to 8,500 psi. Evaluation reports with a listed renewal date month/year which is prior to the month/year the product is submitted for engineer's review will be rejected.
- D. Approved expansions bolts:
 - 1. Simpson Strong-Tie: Strong-Bolt 2
 - a. Compliance Report (ESR-3037)
 - 2. Hilti: Kwik Bolt TZ
 - a. Compliance Report (ESR-1917)
 - 3. Powers: Power-Stud + SD6

- a. Compliance Report (ESR-2502)

2.06 ADHESIVE ANCHORS (INTO CONCRETE)

- A. General: Epoxy adhesive for installing post-installed bolts into concrete denoted as “Adhesive Anchors” on drawings.
- B. Evaluation Requirements: ICC-ES evaluation report stating product is compliant with 2015 International Building Code and approved for use to resist static, wind and earthquake (Seismic Design Categories A through F) tension and shear loads in cracked and uncracked normal-weight concrete having a compressive strength of 2,500 psi to 8,500 psi. Evaluation reports with a listed renewal date month/year which is prior to the month/year the product is submitted for engineer’s review will be rejected.
- C. Epoxy adhesive for anchoring reinforcement to concrete shall be a 2-component solid epoxy based system supplied in manufacturer's standard side-by-side cartridge and dispensed through manufacturer's standard static-mixing nozzle. Epoxy adhesive shall be:
 - 1. Simpson Strong Tie: SET-XP or ET-HP
 - a. SET-XP Compliance Report (ESR-2508)
 - b. ET-HP Compliance Report (ESR-3372)
 - 2. Hilti: HIT-RE 500 V3
 - a. Compliance Report (ESR-3814)
 - 3. Powers: PE1000+
 - a. Compliance Report (ESR-2583)
- D. Epoxy adhesive shall pass the creep test requirements of ICC-ES AC308.
- E. Hardware: From same manufacturer as epoxy adhesive for a complete anchoring system.
 - 1. Threaded Steel Rods: Continuously threads (all-thread).
 - 2. Material: AISI 316 stainless steel threaded steel rods, nut and washers, unless noted otherwise.

2.07 ADHESIVE ANCHORS (INTO MASONRY)

- A. General: Adhesive anchor system for installing post-installed threaded steel rods to grouted and ungrouted CMU, solid and hollow brick walls, and unreinforced multiple wythe brick walls denoted as “Adhesive Anchors” on drawings.

1. All products shall be furnished by the same manufacturer including steel threaded rods, mesh screen tubes, adhesive, and installation equipment.
- B. Evaluation Requirements: ICC-ES evaluation report stating product is compliant with 2015 International Building Code and approved to anchor building components to hollow (ungROUTED) and fully grouted concrete masonry walls to resist static, wind, and earthquake loads.
- C. Adhesive for anchoring reinforcement to masonry shall be furnished in a side-by-side cartridge and dispensed through manufacturer's standard static-mixing nozzle. Adhesive system shall be:
 1. Simpson Strong Tie: SET-XP or ET-HP
 - a. SET Compliance Report (ESR-1772)
 - b. ET-HP Compliance Report (ESR-3638)
 2. Hilti: HIT-HY 70
 - a. Compliance Report (ESR-3342)
 3. Powers: AC100+ Gold
 - a. Compliance Report (ESR-3200)
- D. Epoxy adhesive shall pass the creep test requirements of ICC-ES AC58.
- E. Hardware: From same manufacturer as epoxy adhesive for a complete anchoring system.
 1. Threaded Steel Rods: Continuously threads (all-thread).
 2. Material: AISI 316 stainless steel threaded steel rods, nut and washers, unless noted otherwise.
 3. Screen Tubes/ threaded insets: Manufacturer's standard screen tubes or threaded insets.

2.08 MISCELLANEOUS STEEL ITEMS

- A. Fabricate and furnish miscellaneous steel items, galvanized angles, relieving angles, plates, channels, and all required fastenings per Drawing details. Miscellaneous steel items shall be galvanized as specified.

2.09 ANCHOR BOLTS

- A. ASTM F1554 Grade 36 steel, galvanized except where stainless steel specified, headed and threaded.

- B. Type 316 stainless steel: to attach aluminum and in all submerged locations – including washers and nuts.
- C. Sizes: per Drawings

2.10 STEEL BOLLARDS

- A. Pipe: ASTM A53, 6 inches nominal diameter, schedule 40, galvanized
- B. Length: To allow bollards to extend 4 feet above and below grade, except as otherwise shown on the Drawings

2.11 ROOF PANELS

- A. Uplift
 - 1. The roof assembly shall carry a rating of not less than UL 580 Class 90
- B. Roof panels
 - 1. Metal roof panels shall be Galvalume 24 gauge, 80,000-min. psi aluminum-zinc alloy coated steel conforming to ASTM A792
 - a. The trapezoidal-faced panel shall be 36 inches wide with overlapping sidelaps. The panels shall have an embossed finish with fluoropolymer (70 percent polyvinylidene fluoride (PVF2), 70 percent Kynar) minimum dry film 0.9 mil coating applied to one side
 - b. The panel shall extend from ridge to eave in one piece
 - 2. Roof panels shall be fastened with self-drilling screws with sealing washers, long-life coated to match roof panel color, and properly sized by the Manufacturer.

2.12 SHOP COATING

- A. Prepare ferrous items and paint per Section 09 90 00, except where otherwise specified.
- B. Do not prime paint galvanized steel not specified to be painted, stainless steel surfaces embedded in concrete or masonry (except for partially embedded components, extend priming 2 inches into the embedment), surfaces to be field welded, and faying surfaces at bolted connections designated as slip-critical.
- C. Coat items specified as galvanized by the hot-dip process per ASTM A123, ASTM A153, or ASTM A653, as applicable, in molten zinc, to produce a continuous coating of uniform thickness of weight required by the referenced standards.

1. Coating: Commercial quality, free from injurious defects, flux and uncoated spots, and per ASTM A239: capable of enduring not less than 4 immersions in copper sulfate without penetration of the coating.
 2. Identify galvanized items with a stamp showing the name of the galvanizer, the weight of the coating, and applicable ASTM compliance.
- D. Galvanized steel specified to be painted
1. Do not quench.
 2. Phosphatize and prepare to be painted per ASTM D6386
 3. Prime with paint compatible with the finish paints specified in Section 09 90 00.

2.13 SOURCE OF QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 DISSIMILAR MATERIAL

- A. Keep aluminum surfaces from direct contact with metals other than stainless steel by painting the dissimilar metal with a coating of zinc chromate paint, or provide non-absorptive tape between dissimilar metals.
- B. Paint aluminum with a coat of bituminous paint where aluminum is embedded in, or comes in contact with, concrete, masonry or by-products of these materials.

3.02 STEEL CONNECTIONS

- A. Comply with RCSC Specifications for Structural Joints Using ASTM F3125 Grade A325 or A490 Bolts.
- B. Design bolted connections as N-type bearing connections, installed snug-tight, except where shown as slip critical on Drawings.
- C. Minimum size: 3/4 inch
- D. Minimum number of bolts per connection: 2
- E. Slip critical joints are required per Drawings and at connections that include oversized holes or slotted holes, including braces, except where the direction of the load is normal to the slot.
- F. Where bolts are specified to be installed loose or finger tight, snug up the connection to ensure that plies are in contact. Then back off the nut between 1/2

and 1 turn to permit intended movement of the connection. Provide double nuts on bolts to prevent loosening.

- G. Weld steel per AWS D1.1. Grind exposed welds smooth.

3.03 INSTALLATION

- A. Verify elevations of concrete and masonry bearing surfaces and locations of anchor rods, bearing plates, and other embedments. Clean concrete and masonry bearing surfaces of bond reducing materials and roughen surfaces prior to setting plates.
- B. Set bearing plates using leveling nuts or galvanized leveling plates, and grout with non-shrink grout as specified in Section 03 16 00. Promptly grout leveling plates after set and checked for line, levelness and elevation.
- C. Grout bearing plates after framing is plumb when leveling nuts are used.
- D. Concrete embedments: Installed under Section 03 11 00
- E. Bar rack components to be fastened to concrete: Install from field measurements of cast concrete.
- F. Use stainless steel hardware when anchoring aluminum and in submerged locations.
- G. Steel bollards: Encased in concrete and filled inside of pipe per Section 03 30 00

3.04 BOLTS

- A. Install bolts snug tight except where indicated as slip critical. Install bolt at least flush with the outer face of the nut. Cut off bolts projecting more than 5/8 inch beyond the nut in exposed Work as close to nut as possible and as directed.
- B. All joint surfaces shall be free of loose mill scale, burrs, and foreign material. Enough bolts shall be brought to a snug tight condition to ensure that the parts of the joint are properly compacted, i.e., brought into full contact with each other. Snug tight shall be defined as the tightness attained by a few impacts of an impact wrench or the full effort of a worker using an ordinary spud wrench. Following the initial tightening, bolts shall be placed in any remaining holes in the connection and brought to snug tightness. All bolts in the joint shall be tightened an additional 1/3 turn if bolt length is up to and including four bolt diameters, or a 1/2 if longer.
- C. Provide required cutting, fitting, drilling, and tapping. Do not use thermal cutting during installation and erection. Do not make or modify bolt holes by burning.

3.05 ADHESIVE BOLTS

- A. Installation: Per manufacturer's installation instructions and as listed in the product ICC-ES Evaluation Report
- B. Drilled and epoxied bolts shall be installed in concrete having a minimum age of 21 days at time of installation.
- C. All cartridges shall have the expiration date clearly visible. Material past its expiration date shall not be used and shall be immediately removed from the Site.
- D. Diamond drill bits are not permitted. Hammer drills shall be used.
- E. Drill Holes:
 - 1. Diameter: Per manufacturer's instructions
 - 2. Embedment: Manufacturer's standard embedment for anchor size, unless noted otherwise on drawings. Depth stop shall be used to ensure correct drilling depth.
 - 3. Installation Torque: Per manufacturer's instructions.
- F. The initial material extruded from each cartridge shall be discarded in accordance with the manufacturer's instructions to ensure that all material is properly mixed.
- G. Drilled holes shall be blown out with air, thoroughly wire brushed with a repeated back and forth movement, blown out, thoroughly wire brushed, and blown out again. Adhesive shall be injected, starting from the bottom of the hole and slowly withdrawn as filling progresses to prevent air pockets.
- H. Installed bolt shall remain completely undisturbed between the manufacturer's specified gel time and the full cure time. Zero load shall be applied during this time.

3.06 EXPANSION BOLTS

- A. Installation: Per manufacturer's installation instructions and as listed in the product ICC-ES Evaluation Report.
- B. Drill Holes:
 - 1. Diameter: Per manufacturer's instructions
 - 2. Embedment: Manufacturer's standard embedment for anchor size, unless noted otherwise on drawings. Depth stop shall be used to ensure correct drilling depth
- C. Installation Torque: Per manufacturer's instructions.

3.07 FIELD TOUCH UP

- A. Where galvanized steel is field cut and locations where galvanized coating is removed: Touch up steel surface with zinc rich paint meeting ASTM A780 and containing a minimum of 65 percent zinc at locations.

3.08 CLEANING

- A. Immediately after installation, round or chamfer sharp edges and grind burrs, jagged edges and surface defects smooth. Remove weld splatter.

3.09 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.10 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

SECTION 09 90 00

PAINTING AND COATING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Provide surface preparation and painting in accordance with this Section and applicable reference standards listed in Article 1.03.
 - 2. Provide the following types of painting work per the Paint Schedules attached and on Drawings:
 - a. Painting of new and existing interior concrete, miscellaneous metal, and partition wall surfaces as indicated
 - b. Touch-up painting of factory-coated equipment
- B. Related Requirements
 - 1. Section 05 50 00 – Miscellaneous Metals

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. ASTM International (ASTM)
 - a. ASTM A780 Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
 - b. ASTM D4258 Standard Practice for Surface Cleaning Concrete for Coating
 - c. ASTM D4259 Standard Practice for Abrading Concrete
 - d. ASTM D4260 Standard Practice for Liquid and Gelled Acid Etching of Concrete
 - e. ASTM 4261 Standard Practice for Surface Cleaning Concrete Unit Masonry for Coating
 - f. ASTM D4263 Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method

- g. ASTM D4414 Standard Practice for Measurement of Wet Film Thickness by Notch Gages
 - h. ASTM D4417 Standard Test Method for Field Measurement of Surface Profile of Blast Cleaned Steel
 - i. ASTM D6386 Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Products and Hardware Surfaces for Painting
 - j. ASTM D6944 Standard Test Method for Measuring Humidity with a Psychrometer
 - k. ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
2. International Concrete Repair Institute, (ICRI)
- a. ICRI Technical Guideline No 310.1 Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion
 - b. ICRI Technical Guideline No 310.2 Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair with CSP Chips
3. NACE International, (NACE)
- a. NACE Publication 6D-173 A Manual for Painter Safety
 - b. NACE SP0178 Surface Finishing of Welds Prior to Coating
 - c. NACE No. 6/SSPC-SP13 Surface Preparation of Concrete
4. NSF International (NSF)
- a. NSF/ANSI 61 Drinking Water System Components – Health Effects
5. Steel Structures Painting Council (SSPC)
- a. SSPC-Paint 16, Coal Tar Epoxy-Polyamide
 - b. SSPC-Paint 20, Zinc-Rich Coating Inorganic and Organic
 - c. SSPC-SP12/NACE 5 Surface Preparation and Cleaning of Steel and Other Hard Materials by High and Ultra High-Pressure Jetting Prior to Recoating
 - d. SSPC-SP13/NACE No. 6 Surface Preparation of Concrete
 - e. SSPC-Guide 12 Guide for Illumination of Industrial Painting Projects

- f. SSPC-VIS-1 Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning

B. Definitions

1. Concrete Surface Profiles (CSP) per ICRI Technical Guideline No 310-2. Concrete surface preparation definitions listed below shall be field verified with Concrete Surface Profile Chips.
 - a. CSP 1: Acid Etched
 - b. CSP 2: Grinding
 - c. CSP 3: Light Shotblast
 - d. CSP 4: Light Scarification
 - e. CSP 5: Medium Shotblast
 - f. CSP 6: Medium Scarification
 - g. CSP 7: Heavy Abrasive Blast
 - h. CSP 8: Scabbed
 - i. CSP 9: Heavy Scarification
 - j. CSP 10: Course Planing
2. Surface Preparation of Carbon Steel per SSPC Surface preparation Standards. Definitions below summarize surface preparation requirements for each level of cleaning. Refer to SSPC standards for complete requirement for each level of surface preparation and cleaning.
 - a. Adherent: Mill scale, rust and coating are considered tightly adherent if they cannot be lifting with a dull putty knife.
 - b. SSPC-SP1: Solvent Cleaning: The removal of all visible oil, grease, soil, drawing and cutting compounds and other soluble contaminants from surfaces with solvents or commercial cleaners using various methods of cleaning such as wiping, dipping, steam cleaning or vapor degreasing.
 - c. SSPC-SP2: Hand Tool Cleaning: The removal of all loose mill scale, loose rust, loose paint and other loose detrimental foreign matter by the use of non-power hand tools.
 - d. SSPC-SP3: Power Tool Cleaning: The removal of all loose mill scale, loose rust, loose paint and other loose detrimental foreign matter by the use of power-assisted hand tools.
 - e. SSPC-SP5/NACE 1: White Metal Blast Cleaning: The complete removal of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products and other foreign matter by compressed air nozzle blasting, centrifugal wheels or other specified methods.

- f. SSPC-SP6/ NACE 3: Commercial Blast Cleaning: The complete removal of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products and other foreign matter by compressed air nozzle blasting, centrifugal wheels or other specified methods. Discoloration caused by certain stains shall be limited to no more than 33 percent of each unit area. Unit area is approximately 9 sq in.
 - g. SSPC-SP7 / NACE Brush-off Blast Cleaning: A brush-off, blast-cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, loose mill scale, loose rust and loose coating. Tightly adhered mill scale, rust and coating may remain on the surface.
 - h. SSPC-SP10 / NACE 2 Near-White Metal Blast Cleaning: The removal of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products and other foreign matter by compressed air nozzle blasting, centrifugal wheels or other specified method. Discoloration caused by certain stains shall be limited to no more than 5 percent of each unit area. Unit area is approximately 9 sq. in.
 - i. SSPC-SP11 Power Tool Cleaning to Bare Metal: The removal of all visible oil, grease, dirt, mill scale, rust, paint, oxide, corrosion products, and other foreign matter. Slight residues of rust and paint may be left in the lower portion of pits if the original surface is pitted. Differs from SSPC-SP3 in that it requires more thorough cleaning and a surface profile not less than 1 mil (25 microns).
3. SSPC-SP12 / NACE 5 Pressure Categorization:
- a. Water Jetting: Use of water at high or ultrahigh-pressure to prepare a surface for recoating using pressure above 10,000 psi. Water jetting will not produce a profile; rather it exposes the original abrasive-blast surface profile.
 - b. Low-Pressure Water Cleaning (LP WC): Cleaning performed at pressures less than 5,000 psi.
 - c. High-Pressure Water Cleaning (HP WC): Cleaning performed at pressures from 5,000 psi to 10,000 psi
 - d. High-Pressure Water Jetting (HP WJ): Cleaning performed at pressures from 10,000 psi to 25,000 psi.
 - e. Ultra-High-Pressure Water Jetting (UHP WJ): Cleaning performed at pressures above 25,000 psi.
4. SSPC-SP12 / NACE 5 Visual Conditions of Surface Cleanliness:
- a. Water jetting shall be performed to meet one of the following four conditions: WJ-1, WJ-2, WJ-3, WJ-4, and a minimum acceptable

surface shall have all loose rust, loose mill scale, and loose coatings uniformly removed.

- b. WJ-1: Surface shall be free of all previously existing visible rust, coatings, mill scale, and foreign matter and have a matte metal finish.
- c. WJ-2: Surface shall be cleaned to a matte finish with at least 95% of the surface area free of all previously existing visible residues and the remaining 5% containing only random dispersed stains of rust, coatings, and foreign matter.
- d. WJ-3: Surface shall be cleaned to a matte finish with at least two-thirds of the surface free of all previously existing visible residues (except mill scale), and the remaining one-third containing only randomly dispersed stains of previously existing rust, coatings, and foreign matter.
- e. WJ-4: Surface shall have all loose mill scale, and loose coatings uniformly removed.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Product Data
 - 1. Primers
 - 2. Manufacturer's technical information including label analysis and instructions for handling, storage, and application of each material proposed for use.
 - 3. Manufacturer's material data and certificates of performance for proposed substitutions.
 - 4. List each material and cross-reference the specific coating, finish system, and application. Identify each material by the manufacturer's catalog number and general classification.
- C. Samples and Mockups: as specified in Article 1.06.
 - 1. Provide Samples for initial color selection in the form of manufacturer's color charts. After color selection, furnish color chips of selections made for surfaces to be coated.

- D. Certificates: From manufacturer that products supplied comply with local Regulations controlling use of volatile organic compounds (VOCs).
- E. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.
- B. Qualifications: per Division 01 General Requirements for Applicators and as follows.
 - 1. Engage experienced applicators who have completed painting system applications similar in material and extent to those indicated for the Project that have resulted in a construction record of successful in-service performance.
- C. Samples On wall surfaces and other exterior and interior components, duplicate finishes of prepared Samples. Provide full-coat finish Samples on at least 25 square feet of surface until required sheen, color, and texture are obtained; simulate finished lighting conditions for review of in-place Work.
 - 1. Final acceptance of colors will be from Project-applied Samples.
 - 2. The Engineer will select one room or surface to represent surfaces and conditions for each type of coating and substrate to be painted. Apply coatings in this room or surface according to the Paint Schedules attached and, on the Drawings, or as specified.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.
- B. Packing, Shipping, Handling, and Unloading
 - 1. Deliver materials to the Site in the manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information.
 - a. Product name or title of material
 - b. Product description (generic classification or binder type)
 - c. Manufacturer's stock number and date of manufacture
 - d. Contents by volume, for pigment and vehicle constituents
 - e. Thinning instructions
 - f. Application instructions

- g. Color name and number
- C. Storage and Protection
 - 1. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 degrees F. Maintain containers used in storage in a clean condition, free of foreign materials and residue. Protect from freezing.
 - 2. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and Work areas are protected from fire and health hazards resulting from handling, mixing, and application.
- D. Waste Management and Disposal
 - 1. Remove all unused material from the site, unless the Owner requests portions of unused material to be provided in properly sealed containers for future repair and maintenance of coatings. Transport (extra) material to Owner specified storage facility located at the project site.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

1.09 MAINTENANCE

- A. Extra Materials: Furnish as specified below.
 - 1. Extra material is not specifically required.
 - 2. Provide the Owner the option to retain portions of unused surplus material in properly sealed containers prior to removing from site for disposal.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Tnemec
- B. Sherwin Williams (S&W)
- C. PPG
- D. Or equal

2.02 PAINT MATERIALS

- A. Provide materials designated by item or area to be painted in Paint Schedules attached and on Drawings. Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers.
- B. Provide primers and undercoat paint produced by the same manufacturer as the finish coats.
- C. Material compatibility: Provide block fillers, primers, finish coat materials, and related materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.
- D. Material quality: Manufacturer's best-quality trade sale paint material of the various coating types specified. Ensure paint material containers display manufacturer's product identification.
- E. Colors from the manufacturer's full range of standard colors.

2.03 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions under which painting will be performed for compliance with paint application requirements. Ensure surfaces receiving paint are thoroughly dry before paint is applied. Do not begin to apply paint until unsatisfactory conditions have been corrected.
- B. Coordination of Work: Review other Specifications in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers. Notify the Engineer about anticipated problems using the materials specified over substrates primed by others.

3.02 PREPARATION

- A. General Requirements
 - 1. Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted, or provide surface-applied protection prior to surface preparation

and painting. Following completion of painting operations in each space or area, ensure workers skilled in the trades involved reinstall items..

2. Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease prior to cleaning. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
3. Clean and prepare surfaces to be painted according to the manufacturer's instructions for each substrate condition and as specified herein. Use more stringent cleaning and surface preparation if manufacturer's recommendations differ from the requirements specified herein.
 - a. Provide barrier coats over incompatible primers or remove and re-prime. Notify Engineer in writing about anticipated problems using the specified finish-coat material with substrates primed by others.
 - b. Ensure existing painted surfaces are structurally sound, dry, clean, and free of oil, grease, dirt, mildew, form release agents, curing compounds, efflorescence, loose and flaking paint, or other foreign material. Engineer will approve condition of prepared substrate prior to application of coating system. Test old coatings for lifting per coating manufacturer's recommendations.
4. Abrasive Blast Surfaces: Shall be coated before any visible rust forms on the surface. Abrasive blast cleaning shall be performed only when the relative humidity is no higher than 85% and the surface temperature of the steel at its coldest point is at least 5 degrees Fahrenheit above the temperature of the dew point. Material that is abrasive blast-cleaned shall be primed in the same shift, no more than 12-hours after the surfaces have been blast-cleaned.

B. New or Previously Uncoated Surfaces:

1. Prepare to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, loose rust, and release agents.
 - a. Concrete Surfaces:
 - 1) Curing and Sealing Compounds: If curing and sealing compounds have been applied to concrete surfaces, use CSP-1 Acid etch cleaning or CSP-4 light scarification to remove existing curing and sealing compounds.
 - 2) Abrasive blast-clean to ICRI CSP 2 to CSP 3.
 - 3) Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently

alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

- b. Concrete Masonry Block, (CMU):
 - 1) Prepared surface shall be clean and dry
 - 2) Low-Pressure Water Cleaning (LP WC) as required to provide clean surface
 - c. Ferrous Metals: Prepare metal according as follows:
 - 1) Structural steel, Steel Bar Joists, and miscellaneous metal used for interior building framing components that are not exposed to view and are not scheduled to be field painted: SSPC-SP2 prior to "shop coat" with fabricator's standard primer.
 - 2) Submerged components: Sandblasted clean in accordance with SSPC-SP10/NACE 2, Near-White Blast Cleaning immediately prior to priming.
 - 3) All other Ferrous Metals: Sandblasted clean in accordance with SSPC-SP-6, Commercial Grade, immediately prior to priming.
2. Galvanized Surfaces: Clean galvanized surfaces with non-petroleum-based solvents so that the surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods in accordance with ASTM D6386.
3. PVC Pipe: Scarify surface prior to prime coat.

C. Previously Coated Surfaces:

- 1. Prepare to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, loose rust, and release agents.
 - a. Concrete walls, columns, and ceilings (Excludes Floors): Low-Pressure Water Cleaning (LP WC) to remove existing loose coatings.
 - b. Concrete Floors: ICRI CSP 5 to CSP-6
 - c. Ferrous metals including structural steel columns and beams: SSPC-SP7 Brush-Off Blast Cleaning to remove all dirt, loose rust, and loose coatings.

- d. Painted metal roof or floor deck: SSPC-SP7 Brush-Off Blast Cleaning to remove all dirt, loose rust, and loose coatings.
 - e. Galvanized (corroded) Roof or Floor Deck: SSPC-SP6 Commercial Blast Cleaning or SSPC-SP11 Power Tool Cleaning to Bare Metal.
2. Coating Compatibility: Check for coating compatibility by applying a test patch of the recommended coating system, covering at least 2-3 square feet. Allow to dry one week before testing adhesion per ASTM D3359. If the coating is incompatible contact engineer and coating manufacturer for recommendations.
3. Existing Interior Finished Spaces: Where existing interior occupied spaces are scheduled to be coated, perform surface preparation and cleaning without damage to existing finishes, electronics, and equipment that cannot be removed prior to coating. Surface preparation and cleaning shall include the following steps until all efflorescence, chalk, dust, dirt, grease, oils, loose rust, and release agents are removed.
 - a. Detergent Scrubbing and rinsing as required to removed dust, dirt, grease, oils, and release agents.
 - b. Solvent cleaning.
 - c. Hand Tool Cleaning
 - d. Power Tool Cleaning.
4. Over-Coating of Hard, High-gloss, or existing epoxy coatings. Overcoating mechanical equipment or other surfaces that would otherwise be damaged by Water Cleaning or Abrasive Blast Cleaning:
 - a. Clean existing coating with degreaser or other cleaner recommended by coating manufacturer.
 - b. Remove damaged, delaminated, or questionable portions of existing coat from the substrate.
 - c. Sand, grind, or abrasive blast existing coating to clean and texture surface to improve bond of over-coat.

3.03 COLOR SELECTION

- A. Colors of finish coats: as indicated or specified or as selected by Owner.

3.04 APPLICATION

- A. General
 1. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 degrees F and 90 degrees F.

2. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 degrees F and 95 degrees F.
3. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or to damp or wet surfaces. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.
4. Priming Abrasive Blast Surfaces: Shall be primed before any visible rust forms on the surface. Abrasive blast cleaning shall be performed only when the relative humidity is no higher than 85% and the surface temperature of the steel at its coldest point is at least 5 degrees Fahrenheit above the temperature of the dew point. Material that is abrasive blast-cleaned shall be primed in the same shift, no more than 12-hours after the surfaces have been blast-cleaned.
5. Carefully mix and prepare paint materials according to manufacturer's directions.
 - a. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
 - b. Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.
6. Use only thinners approved by the paint manufacturer and only within recommended limits
7. Apply paint according to manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
 - a. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 - b. Paint colors, surface treatments, and finishes as indicated in the Paint Schedules.
 - c. Provide finish coats that are compatible with primers used.
 - d. The number of coats and the film thickness required are the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce a smooth even surface according to the manufacturer's directions.

- e. Apply additional coats if undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed surfaces/fasteners, receive a dry film thickness equivalent to that of flat surfaces.
 - f. The term “exposed surfaces” includes areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
 - g. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - h. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.
 - i. Paint backsides of access panels and removable or hinged covers to match exposed surfaces.
 - j. Finish exterior doors on tops, bottoms, and side edges same as exterior faces.
 - k. Sand lightly between each succeeding enamel or varnish coat.
 - l. Omit primer on metal surfaces that have been shop-primed and touch-up painted.
 - m. Prime concrete masonry unit (CMU) walls and apply 1 finish coat prior to installation of any wall mounted equipment, piping, conduits, or fixed objects that would limit access for application of coating system and/or conceal portions of the wall surface. Apply second finish coat after all Work of other trades is completed.
- B. Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
- 1. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.
- C. Apply paints and coatings by brush, roller, spray, or other applicators according to the manufacturer's directions.
- 1. Use brushes best suited for the material applied.

2. Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
 3. Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.
- D. Apply materials no thinner than the manufacturers' recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.
- E. Paint only mechanical and electrical work exposed in mechanical equipment rooms and in occupied spaces and paint mechanical, electrical, HVAC, process equipment, and other utility items as indicated on the Drawings. Do not paint items that are factory painted. Factory applied coating systems are specified in the Specification where the product or item is specified. Items to be painted include:
1. Tanks
 2. Supports
 3. Motors and mechanical equipment
 4. Accessory items
- F. Ferrous metals indicated on the Drawings to be painted will be provided with a shop primer compatible with the coatings specified. Paint ferrous metals specified in Section 05 50 00 that are not galvanized and indicated to be painted on the Drawings.
- G. Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

3.05 PRIME COATS

- A. Before applying finish coats, apply a prime coat of material as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime-coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing. Apply prime coat to previously painted surfaces if finish coats are not compatible with existing coating.

3.06 PIGMENTED (OPAQUE) FINISHES

- A. Completely cover to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

3.07 COMPLETED WORK

- A. Match approved Samples for color, texture, and coverage. Remove, refinish, or repaint Work not complying with specified requirements.

3.08 CLEANING

- A. At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the Site. Clean up debris resulting from Work and dispose in Project on-site trash receptacles.
- B. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.09 PROTECTION

- A. Protect Work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Engineer.
- B. Provide Wet Paint signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their Work after completing painting operations..
- C. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.10 REPAIR

- A. Hot-dip Galvanized Surfaces:
 - 1. Field repair all damaged hot-dip galvanized coatings.
 - 2. Work shall conform to ASTM A780.
- B. Coatings:
 - 1. Repair any damaged shop applied primers and coatings as required to provide the same level of protection as provided by undamaged coating systems.
 - 2. Color and finish of repairs shall match adjacent undamaged coating.

3.11 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

- B. Site/Field tests and inspections: May be required by Owner up to 4 times during the period when paint is being applied.
1. Engage the services of an independent testing agency with minimum 5 years of experience to sample the paint material used. Provide that Samples of material delivered to the Project are taken, identified, sealed, and certified in the presence of the Contractor.
 2. The independent testing agency shall perform appropriate tests at no additional cost to the Owner for the following characteristics:
 - a. Quantitative materials analysis
 - b. Abrasion resistance
 - c. Apparent reflectivity
 - d. Flexibility
 - e. Washability
 - f. Absorption
 - g. Accelerated weathering
 - h. Dry opacity
 - i. Accelerated yellowness
 - j. Recoating
 - k. Skinning
 - l. Color retention
 - m. Alkali and mildew resistance
 3. If test results show material being used does not comply with specified requirements, stop painting, remove noncomplying paint, repaint surfaces coated with rejected paint, and remove rejected paint from previously painted surfaces if, upon repainting with specified paint, the two coatings are incompatible

3.12 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

3.13 ATTACHMENTS

- A. Paint Schedule.

END OF SECTION

PAINT SCHEDULE

Number of coats scheduled is as a minimum. Painting and finishing shall conform to applicable Laws and building code regarding fire hazard classifications and volatile organic content of finish materials. Products listed shall not be in-contact with Potable Water and do not comply with NSF/ANSI 61. Provide products by the manufacturers named or approved equal.

Provide paint and coating systems listed below where the Drawings refer to this Specification section or reference any item to be painted or coated, unless a specific paint or coating system is specified elsewhere.

This list is intended to cover all potential conditions that may require painting and not all paint and coating systems listed below may not be included in the Work.

A. Equipment: Exterior Non-Submerged Ferrous Metals (Epoxy, Polyurethane)			
Factory Applied Primer	1.	Tnemec: Series 1 Omnithane	DFT 2.5 – 3.5 mils
	2.	S-W: Corothane I Galvapac Zinc Primer 1K	DFT 3 – 4 mils
	3.	PPG: Amercoat 68 HS	DFT 2 – 5 mils
	4.	Or Equal	
Factory Applied Intermediate Coat	1.	Tnemec: Series 66HS Hi-Build Epoxoline	DFT 3 – 5 mils
	2.	S-W: Macropoxy 646-100	DFT 3 – 5 mils
	3.	PPG: Amercoat 370	DFT 4 – 6 mils
	4.	Or Equal	
Factory Applied Finish Coat	1.	Tnemec: Series 73-color Endura-Shield	DFT 2.5 – 5 mils
	2.	S-W: Hi-Solids Polyurethane	DFT 3 – 5 mils
	3.	PPG: Amercoat 450H Shield	DFT 2 – 5 mils
	4.	Or Equal	
B. Equipment: Interior Non-Submerged Ferrous Metals (Epoxy)			
Factory Applied Primer	1.	Tnemec: Series 1 Omnithane	DFT 2.5 – 3.5 mils
	2.	S-W: Corothane I Galvapac Zinc Primer 1K	DFT 3 – 4 mils
	3.	PPG: Amercoat 68 HS”	DFT 2 – 5 mils
	4.	Or Equal	
Factory Applied Intermediate Coat	1.	Tnemec: Series 66HS Hi-Build Epoxoline	DFT 3 – 5 mils
	2.	S-W: Macropoxy 646-100	DFT 3 – 4 mils
	3.	PPG: Amerlock2/400	DFT 4 – 8 mils
	4.	Or Equal	
Factory Applied Finish Coat	1.	Tnemec: Series 66HS Hi-Build Epoxoline	DFT 3 – 5 mils
	2.	S-W: Macropoxy 646-100	DFT 3 – 4 mils
	3.	PPG: Amerlock2/400	DFT 4 – 8 mils
	4.	Or Equal	

C. Hot-Dip Galvanized Field Repair Coating (SSPC Paint 20, Acrylic/Polyurethane)			
Field Applied SSPC Paint Spec 20 (Repair Coat)	1.	Tnemec: Series 90-97 Tneme-Zinc	DFT 2.5 – 3.5 mils
	2.	S-W: Zinc Clad 200	DFT 2 – 3 mils
	3.	PPG: Amercoat 68 HS	DFT 2 – 5 mils
	4.	Or Equal: conforming to SSPC Paint Spec 20	
Field Applied (2) Finish Coats (color match Hot-dip finish)	1.	Tnemec: Series 1029 Enduratone	DFT 2– 3 mils/ct
	2.	S-W: Pro-Industrial DTM Acrylic	DFT 4– 6 mils/ct
	3.	PPG: Amercoat 450H	DFT 4– 5 mils/ct
	4.	Or Equal	
D. Ferrous Metals: Exterior Exposure (Epoxy, Polyurethane)			
Factory Applied Primer	1.	Tnemec: Series 66HS Hi-Build Epoxoline	DFT 2 – 3 mils
	2.	S-W: Macropoxy 646	DFT 4 – 6 mils
	3.	PPG: Amercoat 385	DFT 4 – 8 mils
	4.	Or Equal	
Field Applied Two Finish Coats	1.	Tnemec: Series 1095 Endura-Shield	DFT 2 – 5 mils/ct
	2.	S-W: High Solids Polyurethane	DFT 3 – 4 mils/ct
	3.	PPG: Amercoat 450H	DFT 2 – 4 mils/ct
	4.	Or Equal	
E. Ferrous Metals: Interior Exposure (Epoxy)			
Factory Applied (Shop Primer)	1.	Fabricator's Standard Shop Primer: only permitted if specified (allowed) in other Specification Sections.	DFT 1 mil
Factory Applied Primer (unless noted otherwise)	1.	Tnemec: Series 27 F.C. Typoxy	DFT 2 – 3 mils
	2.	S-W: Recoatable Epoxy Primer	DFT 4 – 6 mils
	3.	PPG: Amerlock 370	DFT 4 – 6 mils
	4.	Or Equal	
Field Applied Two Finish Coats	1.	Tnemec: Series 66HS Hi-Build Epoxoline	DFT 2 – 3 mils/ct
	2.	S-W: Macropoxy 646	DFT 3 – 5 mils/ct
	3.	PPG: Amerlock 2	DFT 4 – 8 mils/ct
	4.	Or Equal	
F. Interior Gypsum Board or Plywood Walls Heavy-Abuse Coating (Epoxy) gloss or semi-gloss			
Field Applied Prime Coat	1.	Tnemec: Series 151-1051 Elasto-Grip FC	DFT 1– 1.5 mils
	2.	S-W: PrepRite 200 Latex Primer	DFT 1 – 1.5 mils
	3.	PPG: Seal Grip Primer	DFT 1 – 1.5 mils
	4.	Or Equal	
Field Applied Intermediate Coat	1.	Tnemec: Series 280 Tneme-Glaze	DFT 4 – 8 mils
	2.	S-W: Pro Industrial WB Catalyzed Epoxy	DFT 4 – 8 mils
	3.	PPG: HPC High Gloss Epoxy	DFT 4 – 8 mils
	4.	Or Equal	

Field Applied Finish Coat	1. Tnemec: Series 280 Tneme-Glaze 2. S-W: Pro Industrial WB Catalyzed Epoxy 3. PPG: HPC High Gloss Epoxy 4. Or Equal	DFT 4 – 8 mils DFT 4 – 8 mils DFT 4 – 8 mils
G. Interior or Exterior Steel Doors and Frames- (Polyurethane)		
Shop Applied Prime Coat	1. Factory Primed Per Section 08 11 00	
Field Applied Two Finish Coats	1. Tnemec: 1095 Endura-Shield 2. S-W: High Solids Polyurethane 3. PPG: Amercoat 450H 4. Or Equal	DFT 2 – 5 mils DFT 3 – 4 mils DFT 2 – 4 mils
H. Bituminous Coating (SSPC Paint 16)		
Shop Applied & (Field Touch-up)	2. Tnemec: Series 46H-413 Tneme-Tar 3. S-W: Targuard Coal Tar Epoxy 4. PPG: Amercoat 78HB	2 shop coats DFT 8– 10 mils/ct

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SECTION 26 05 00

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide the labor, tools, equipment, and materials necessary to furnish and install all electrical work as specified herein and in accordance with the Drawings and applicable reference standards listed in Article 1.03.
2. In general, electrical Work shall include but not be limited to the following:
 - a. All motor wiring, safety disconnects, and motor starters unless integral with equipment
 - b. Relocation, extension, reconnection and reinstallation of electrical associated with existing compactor.
 - c. Installation of electrical associated with Compactor furnished by others.
 - d. Power distribution equipment modifications
 - e. Equipment connections
 - f. Wiring devices
 - g. Motor controls not provided by other divisions
 - h. Control wiring not provided by other divisions
 - i. Compactor equipment grounding
 - j. Lighting – Building interior, new and relocation
 - k. All support material and hardware for raceway and electrical equipment
 - l. Branch circuit wiring
 - m. Installation, termination & labeling of all cable and signal wiring for instrumentation and process control equipment.
 - n. Building wall, floor and roof penetrations for raceways
 - o. Start up, acceptance testing test reports and instruction of systems operation to the Owner

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. Electrical equipment, materials, installation and workmanship shall comply with all state and local building codes, safety and fire law Regulations at the location of the Work and shall conform to the latest edition of the applicable codes and standards of the organizations listed:
 - a. National Electrical Code (NEC)
 - b. Underwriters' Laboratories (UL)
 - c. Institute of Electrical and Electronics Engineers (IEEE C2)
 - d. American National Standards Institute, Inc. (ANSI)
 - e. National Fire Protection Association (NFPA)
 - f. National Electrical Manufacturers Association (NEMA)
 - g. Insulated Power Cable Engineers Association (IPCEA)
 - h. Association of Edison Illuminating Companies (AEIC)
 - i. Occupational Safety Health Act (OSHA)
 - j. Americans with Disabilities Act (ADA)
2. Where the Contract requires the Work or any part of the same, to be above the standards required by applicable Laws, ordinances, rules and Regulations and other statutory provisions pertaining to the Work, such Work shall be performed and completed in accordance with the Contract requirements.
3. Should any changes in the Specifications and Drawings be necessary to conform to the requirements of any of the above mentioned codes or standards, the Contractor shall so notify the Owner's Representative.

- B. Drawings required by Governing Authorities: Prepare any detailed diagrams or Drawings which may be required by the governing authorities.

C. Permits, Certificates, Inspections, Fees and Utility Costs:

1. The Contractor shall obtain and make payments for all permits, licenses, and certificates that are required for the associated Work.
2. Following completion of the Work, the Contractor shall obtain certificates of approval from the responsible agencies concerned with the Work.

3. Arrange for timely inspections required for Work under this section.
4. All utility company and municipal back charges shall be the responsibility of the Contractor. Cost of electricity shall be borne by the Contractor until substantial completion as determined by the Owner.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.
- B. The electrical work shall be coordinated with the Work of other trades to prevent interferences and so that the progress in construction of the building will in no way be retarded.
- C. Coordinate with all local utility companies and make all installations for their services in accordance with all utility company requirements.
- D. Where lighting fixtures and other electrical items are shown in conflict with locations of structural members and mechanical or other equipment, furnish and install all required supports and wiring to clear the encroachment for a complete installation.
- E. Any Work installed contrary to or without acceptance by the Engineer shall be subject to change as directed by the Engineer, and no extra compensation will be allowed to the Contractor for making these changes.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Furnish manufacturer's product data, test reports, and materials certifications as required.
- C. Follow the procedures specified in Division 01 Section "Submittals" and in addition, the Contractor shall prepare and submit a complete submittal list to the Engineer. The submittal list shall include all submittal items covered in the Division 26 Specification sections.
- D. Shop Drawings shall be submitted to the General Contractor who shall review and approve them prior to submittal to the Engineer for approval. Shop Drawings shall identify the specific equipment and material being supplied; the quantity being supplied; and all accessories, dimensions, descriptions, mounting and connection details, wiring diagrams, elementary control diagrams, equipment interface diagrams and any other information necessary to determine compliance with the Plans and Specifications. Fabrication and installation shall be in accordance with the approved Shop Drawings.

- E. As-built copies of all Shop Drawings shall be submitted to the Engineer.
- F. Submit copies of reports, permits, and easements necessary for installation, use, and operation.
- G. Submit copies of reports of tests, inspections, and meter readings as specified.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

1.09 WARRANTY

- A. Special Warranty/Extended Correction Period
- B. Compile and assemble the warranties specified in Division 26 into a separate set of vinyl covered three ring binders, tabulated and indexed for easy reference.
- C. Provide complete warranty information for each item. Information to include:
 - 1. Product or equipment list
 - 2. Date of beginning of warranty or bond
 - 3. Duration of warranty or bond
 - 4. Names, addresses, and telephone numbers and procedures for filing a claim and obtaining warranty services

1.10 DRAWINGS

- A. The Specifications supplement the Drawings and provide information pertaining to the methods and materials to be used in the execution of the Work. When a discrepancy occurs between the two, the stricter of the two shall govern.
- B. All electrical equipment such as junction and pull boxes, panelboards, switches, controls and such other apparatus as may require maintenance and operation from time to time shall be made easily accessible and properly labeled.
- C. The Contractor shall examine all Contracts and reference Drawings, and verify and properly coordinate the placement of outlets. Contractor shall also check all

Drawings including mechanical Drawings and Shop Drawings for apparatus for which he must rough-in and to which he must connect.

1.11 RECORD DRAWINGS

- A. The Contractor shall maintain a complete and separate set of prints of Drawings and Specifications at job Site for duration of the Contract. The Contractor shall record Work completed and all changes from original Contract. Drawings shall clearly and accurately include Work installed as a modification or as an addition to the original design.
- B. At completion of Work and prior to final request for payment, the Contractor shall submit a complete set of reproducible Record Drawings showing all systems as actually installed.

1.12 JOB CONDITIONS

- A. Existing Conditions
 - 1. Existing Utilities: Locate existing underground utilities in excavation areas. If utilities are indicated to remain, support and protect services during excavation operations.
 - 2. Prior to all Work of this section, carefully inspect the installed Work of all other trades and verify that all such Work is complete to the point where this installation may properly commence.
 - 3. Verify that the electrical installation may be made in complete accordance with all pertinent codes and Regulations and the original design.
- B. Coordination:
 - 1. Coordinate the installation of electrical items with the schedules for Work of other trades to prevent unnecessary delays in the total Work.
 - 2. Coordinate with all local utility companies and make all installations for their services in accordance with all utility company requirements.
 - 3. Any changes shall be done at the Contractor's expense.
 - 4. Where lighting fixtures and other electrical items are shown in conflict with locations of structural members and mechanical or other equipment, furnish and install all required supports and wiring to clear the encroachment for a complete installation.
 - 5. Any Work installed contrary to or without acceptance by the Engineer shall be subject to change as directed by the Engineer, and no extra compensation will be allowed to the Contractor for making these changes.

C. Accuracy of Data:

1. The Drawings are diagrammatic and functional only, and are not intended to show exact circuit layouts, number of fittings, components and place in satisfactory operational power, lighting, and other electrical systems shown. Install additional circuits, components and material wherever needed to conform to the specific requirements of the equipment whether or not indicated or specified.
2. Information and components called for in the Specification but not shown on Plans or vice versa shall apply and shall be provided as though required expressly by both.
3. The locations of equipment, fixtures, outlets and similar devices shown on the Drawings are approximate only. Field measurements shall take precedence over scaled dimensions from Drawings. Exact locations shall be as accepted by Engineer during construction. Obtain in the field all information relevant to the placing of electrical work and, in case of any interference with other Work, proceed as directed by the Engineer and furnish all labor and materials necessary to complete the Work in an acceptable manner.
4. The Drawings and the Specifications are intended to comply with all pertinent codes, Regulations and standards. In the event of discrepancy, the Contractor shall immediately notify the Engineer in writing of said discrepancies and apply for an interpretation and, unless an interpretation is offered in writing by the Engineer prior to the execution of the Contract, the applicable rules and Regulations shall be complied with as a part of the Contract.
5. In case of difference between building codes, Specifications, state Laws, industry standards and the Contract Documents, the most stringent shall govern. Should the Contractor perform any Work that does not comply with the requirements of the applicable building codes, state Laws, and industry standards, he shall bear all cost arising in correcting these deficiencies.
6. Verify size and ratings of motors and other electrically operated devices supplied by others.
7. Check with Engineer before installation of Work for outlets not specified as to location or for Work that interferes with other trades.

1.13 FLASHING, CUTTING, FIREPROOFING AND WATERPROOFING

- A. Flashing around all electrical items penetrating roof or exterior walls shall be the responsibility of the General Contractor.

- B. All cutting of surfaces, including core drilling of walls and slabs, shall be done by the General Contractor.
- C. Patching shall be done by the General Contractor.
- D. The General Contractor shall fireproof, waterproof and seal all openings in slabs and walls.

1.14 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Use all means necessary to protect electrical system materials before, during and after installation and to protect the installed Work and materials of all other trades.
- B. In the event of damage, immediately make all repairs and replacements necessary to the acceptance of the Engineer and at no additional cost to the Owner. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through such special tests as directed by the Engineer, at the cost and expense of the Contractor, or shall be replaced by the Contractor at his own expense.
- C. Protect the Work of other trades. Restore any damage caused to other trades to the condition existing prior to damage at no additional cost to the Owner.
- D. Investigate each space in the building through which equipment must pass to reach its final location. If necessary, the manufacture shall be required to ship his material in sections sized to permit passing through such restricted areas in the building.

1.15 WORK PERFORMANCE

- A. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished in this manner for the required Work, the following requirements are mandatory:
 - 1. Electricians must use full protective equipment (i.e., certified and tested insulating material to cover exposed energized electrical components, certified and tested insulated tools, etc.) while working on energized systems in accordance with NFPA 70E.
 - 2. Electricians must wear personal protective equipment while working on energized systems in accordance with NFPA 70E.
 - 3. Before initiating any Work, a job specific Work plan must be developed by the Contractor and the Owner. The Work plan must include procedures to be used on and near the live electrical equipment, barriers to be installed, and safety equipment to be used and exit pathways.

4. Work on energized circuits or equipment cannot begin until prior written approval is obtained from the Owner.

1.16 DEFINITIONS

- A. As used in this Specification, “provide” means “furnish and install”, “furnish” means “to purchase and deliver to the Project Site complete with every necessary appurtenance and support and to store in a secure area in accordance with manufacturer’s instructions”, and “install” means “to unload at the delivery point at the Site or retrieve from storage, move to point of installation and perform every operation necessary to establish secure mounting and correct operation at the proper location in the Project”.
- B. Finished Areas: In general, areas with carpet or tile floors, lay-in or fixed ceiling tile, special architectural ceiling treatment, or tiled, plastered, or paneled walls shall be considered finished areas.
- C. Interior: For the purposes of this Specification, interior is any area within the boundaries of the foundation of any building within the superstructure or other structures not classified as a building.

1.17 TEMPORARY POWER

- A. The Contractor shall furnish, install, maintain, and remove the temporary electrical power and lighting systems, including lamps, and pay for all labor, materials, and equipment required therefore. All such temporary electrical work shall meet the requirements of the National Electrical Code, the local utility company, and OSHA.
- B. The Contractor shall make all necessary arrangements with the local utility company as to where the temporary electric service can be obtained.
- C. The Contractor shall secure and pay for all required permits and back charges for Work performed by others, and other expenses incidental to the installation of the temporary electric service.

1.18 POSTED OPERATING INSTRUCTIONS:

- A. Provide for each system and principal item of equipment as specified in the technical sections for use by operation and maintenance personnel. The operating instructions shall include the following:
 1. Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
 2. Start up, proper adjustment, operating, lubrication, and shutdown procedures.

3. Safety precautions.
 4. The procedure in the event of equipment failure.
 5. Other items of instruction as recommended by the manufacturer of each system or item of equipment.
- B. Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions where directed. For operating instructions exposed to the weather, provide weather-resistant materials or weatherproof enclosures. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

1.19 MANUFACTURER'S NAMEPLATE

- A. Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.20 FIELD FABRICATED NAMEPLATES

- A. Provide laminated plastic nameplates for each equipment enclosure, relay, switch, and device; as specified in the technical sections or as indicated on the Drawings. Each nameplate inscription shall identify the name of the equipment, function and, when applicable, the position. Nameplates shall be melamine plastic, 0.125 inch thick, black with white letters. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be one by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block style. All electrical equipment shall be labeled with the following:
1. Panel Name
 2. Fed from "Panel Name" & "CKT #"
 3. Amps
 4. Volts
 5. Phase

1.21 ARC FLASH LABEL

- A. Provide arc flash labels for all electrical equipment with operating voltages greater than 50 volt per NEC 110.16.

1.22 WARNING SIGNS

- A. Exterior warning and caution signs shall be weather resistant, nonfading, preprinted cellulose acetate butyrate signs with 20 gauge, galvanized steel backing, with colors, legend, and size appropriate to the location.
- B. Interior warning and caution signs shall be aluminum signs with preprinted baked enamel finish and punched for fasteners. Colors, legend, and size appropriate to location.

1.23 WIRE AND CABLE MARKERS

- A. Underground line marking tape shall be permanent, bright colored, continuous printed, metal backed, plastic tape compounded for direct burial service not less than 6 inches wide. Printed legend indicative of general type of underground line below.
- B. Wire labels for wires smaller than No. 4. shall be vinyl or vinyl cloth, self-adhesive, wraparound, wire markers with preprinted numbers and letters. Wire sizes No. 4 and larger and multi conductor cables shall be marked with one-piece, nylon locking marker ties equal to Panduit PLM Series.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Materials and equipment shall be listed by UL unless it can be demonstrated that no UL standards exist for a specific item or class of equipment.
- B. All other materials, not specifically described but required for a complete and operable electrical installation, shall be new, first quality of their respective kinds, Specification grade or better, and as selected by the Contractor subject to the acceptance by the Engineer.
- C. All materials and equipment furnished and installed on this Project shall meet the most stringent efficiency standards of the local utility to qualify for the maximum rebate.

2.02 MATERIAL AND CONSTRUCTION REQUIREMENTS

- A. Unless otherwise shown or specified, all enclosures, motors, wiring and other materials and all construction methods shall conform to the following:
 - 1. Indoor, Above Ground, Dry Areas - NEMA 12, General Purpose, with gasketing for applications where atmospheric conditions are normal. Enclosures shall be sheet steel, treated to resist corrosion, prime painted and finished with a gray baked-on enamel. Control stations shall have NEMA 13, oil tight and dust-tight enclosures.

2. Outdoors, Moist Areas and Indoor Below Grade Areas - NEMA 4, watertight. Enclosures shall be cast aluminum or stainless steel. Where indicated on electrical Plans provide NEMA 4X enclosures of stainless steel or reinforced non-metallic (Krydon) construction. All installations shall utilize only stainless steel fasteners/hardware.
3. Indoor-Outdoor, Subject to Submersion in Liquid - NEMA 6, submersible, liquid tight construction. Enclosures shall be cast aluminum.
4. Hazardous Areas - NEMA 7 & 9, explosion-proof construction for Class 1, Division 1, Group D areas. Enclosures shall be cast aluminum.
5. Corrosive Atmospheres - All Work located in corrosive atmospheres, such as atmospheres in the filter area and the chemical feed pump areas shall be of such construction that the corrosive agent cannot enter into and damage the electrical work. All materials in these areas shall be non-corrodible or finished with an inert coating. Stainless steel, or reinforced PVC electrical enclosures and PVC coated rigid conduit and fittings are required. In addition, provide gas tight seals in all conduits passing from or into corrosive areas (similar to Crouse Hinds Type EYS), to minimize migration of corrosive fumes to other building areas.

2.03 INTERCHANGEABILITY

- A. In all design and purchasing, interchangeability of items of equipment, subassemblies, parts, motors, starters, relays and other items is essential. All similar items shall be of the same manufacturer, type, model and dimensions.
- B. For ease of maintenance and parts replacement, to the maximum extent possible, use equipment of a single manufacturer.
- C. The Engineer reserves the right to reject any submittal which contains equipment from various manufacturers if suitable materials can be secured from fewer manufacturers and to require that source of materials be unified to the maximum extent possible.

2.04 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 COORDINATION

- A. Prior to all Work of this section, carefully inspect the installed Work of all other trades and verify that all such Work is complete to the point where this installation may properly commence.

- B. Field verify all locations and dimensions to ensure that the equipment will be properly located, readily accessible, and installed in accordance with all pertinent codes and Regulations, the Contract Documents, and the referenced standards.
- C. The Work shall be carefully laid out in advance, and where cutting, drilling, etc., of floors, walls, ceilings, or other surfaces is necessary for the proper installation, this Work shall be carefully done, and any damage to building, piping, or equipment shall be repaired by skilled mechanics of the trades involved at no additional cost to the Owner.
- D. In the event any discrepancies are discovered, immediately notify the Owner's Representative in writing. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.02 INSTALLATION

- A. Install all equipment and fixtures in complete accordance with the manufacturer's recommendations and all pertinent codes and Regulations.
- B. Thoroughly inspect all items of equipment and any items dented, scratched, or otherwise damaged in any manner shall be replaced or repaired and painted to match original finish. All items so repaired and refinished shall be brought to the attention of the Engineer for inspection and acceptance.
- C. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete or supported from or on other structural components, as they are constructed.
- D. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building and equipment which must be placed in service before further construction can take place.
- E. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
- F. The final routing of raceways shall be determined by structural conditions, interferences with other trades and by terminal locations on apparatus. The Engineer reserves the right of a reasonable amount of shifting at no extra cost up until time of roughing in the Work.
- G. Where circuits are shown as "home-runs" all necessary fittings and boxes shall be provided for a complete raceway installation.
- H. In general, wiring and raceway systems for security alarm, fire alarm, telephone and intercommunications systems are not indicated on the Drawings but shall be furnished and installed under this section.

- I. Each lighting and each receptacle circuit shall have its own neutral, dedicated to that circuit. A common neutral for more than one signal phase circuit is not allowed.
- J. Surface mounted panel boxed, junction boxes, conduits, etc., shall be supported by spacers to provide a clearance between wall and equipment.
- K. Upon completion of all installation, lamping, and testing, thoroughly inspect all exposed portions of the electrical installation and completely remove all exposed labels, soils, markings and foreign material.

3.03 MARKING AND LABELING

- A. All panelboards, indoor transformers, cabinets, control panels and other specified equipment shall be labeled with engraved laminated plastic plates with engraved letters. Punch tapes with mastic backings are not acceptable.
- B. All starters, disconnect switches and other specified equipment shall be marked with engraved laminated plastic plates and engraved letters. Where individual switches are circuit breakers in power or distribution panel boards do not have cardholders, they shall be marked with ½" high labels.
- C. All empty conduits shall have labels tied to the pull string at each end of each empty conduit, marked as to identification of each end. Junction boxes with circuits provided for future use shall be labeled with appropriate circuit designation.
- D. All panelboards directories shall be filled out with typewritten identification of each circuit.

3.04 WIRE AND CABLE MARKERS

- A. Tag control circuit conductors at both ends and at junction box splices using wire and cable markers with identification numbers as designated on equipment wiring diagrams. Provide typed listing to identify conductors by number and use.
- B. Identify spare conductors, individually, at both ends and at junction box splices with number between 1 and 999. Do not duplicate numbers.
- C. Identify wire numbers on terminal block marking strips.
- D. Provide permanent plastic name tag indicating load for each feeder for all junction boxes, handholes and manholes. Label all process motor wires to yard equipment in handholes and manholes.

3.05 TEST & SETTINGS

- A. Provide the services of an independent Testing Agency to perform the specified tests outlined in their respective specification sections.

- B. Provide necessary material, equipment, labor and technical supervision to perform and complete the Electrical Acceptance Tests as required.
- C. Acceptance tests as herein specified are defined as those tests and inspections required to determine that the equipment involved is acceptable as delivered to the job Site, that the equipment may be energized for final operational tests and is in accordance with the Specifications.
- D. Final acceptance of the equipment and/or workmanship will depend upon performance characteristics as determined by the subject tests, in addition to complete operation tests, on all electrical equipment to show that it will perform the functions for which it was designed.
- E. If the test and inspection data submitted should indicate deficiencies in the operation of the electrical apparatus or in the manufacturer thereof, the Contractor shall promptly implement the necessary adjustments, corrections, modifications and/or replacements necessary to be made to meet the specified requirements.
- F. Upon completion of the remedial Work, the Testing Agency shall repeat all of the tests on components previously found deficient on the first test or any additional test if they be required. It shall be the responsibility and obligation of the Contractor to have all remedial Work accomplished as may be required by second and/or additional tests.

3.06 CLEANING

- A. When all Work is complete and has been tested and accepted by the Owner's Representative, the Contractor shall clean all light fixtures, equipment, and exposed surfaces that have been directly affected by this Work. The Contractor, insofar as the Work is concerned, shall at all times keep the premises in a neat and orderly condition and at the completion of the Work shall properly clean up and remove from the Site any excess materials.

3.07 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.08 STARTUP & COMMISSIONING

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide the labor, tools, equipment, and materials necessary to install wires, cables, and connectors in accordance with the Plans and in accordance with this section and applicable reference standards listed in Article 1.03.
2. This section includes wires, cables, and connectors for power, lighting, signal, control, and related systems rated 600 volts and less.

B. Related Requirements

1. Division 26: Section 26 05 00 COMMON WORK RESULTS FOR ELECTRICAL

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

A. Reference Standards

1. National Fire Protection Association (NFPA) 70
2. National Electrical Code (NEC)
3. Underwriter's Laboratories, Inc. (UL) Compliance
 - a. UL Standard 83 Thermoplastic Insulated Wires and Cables
 - b. UL Standard 486A Wire Connectors and Soldering Lugs for Use with Copper Conductors
 - c. UL Standard 854 Service Entrance Cable
4. National Electrical Manufacturers Association (NEMA) Compliance
 - a. WC 5 Thermoplastic Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

- b. WC 7 Cross-Linked Thermosetting Polyethylene Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
- c. WC 8 Ethylene Propylene Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
- 5. Institute of Electrical and Electronic Engineers (IEEE) Compliance
 - a. Standard 82 Test Procedure for Impulse Voltage Tests on Insulated Conductors

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Product data
 - 1. Product data for electrical wires, cables, and connectors
 - 2. Product data for Megger insulation testing instrument
 - 3. Report sheets for Megger testing
- C. Manufacturer Reports
 - 1. Furnish manufacturer's product data, test reports, and materials certifications as required

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.
- B. Deliver wire and cable properly packaged in factory fabricated type containers or wound on NEMA specified type wire and cable reels.
- C. Store wire and cable in clean dry space in original containers. Protect products from weather, damaging fumes, construction debris, and traffic.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 MATERIALS

A. General

1. Provide factory-fabricated wires of sizes, ampacity ratings, and materials for applications and services indicated. Where not indicated, provide proper wire selection as determined by Installer to comply with Project's installation requirements, NEC and NEMA standards.
2. Provide color-coding for phase identification as specified herein.
3. Provide factory applied nylon or polyvinyl chloride (PVC) external jackets on wires and cables for pulls in raceways over 100 feet in length, for pulls in raceways with more than three equivalent 90 degree bends, for pulls in conduits underground or under slabs on grade, and where indicated.

B. Service & Distribution Wiring

1. 98 percent conductivity copper
2. 600 volt insulation, type XHHW
3. U.L. listed for underground use in wet locations at 75 degrees C
4. Use XHHW for #4 and larger and THHN/THWN or XHHW for #6 and smaller

C. Building Wiring

1. 98 percent conductivity copper
2. 600 volt insulation, type, THWN/THHN, or XHHW
3. Stranded conductor: 14 AWG and larger
4. Minimum branch circuit: 12 AWG
5. Minimum 10 AWG for 120-volt circuits more than 100 feet long
6. Minimum 10 AWG for 277-volt circuits more than 230 feet long

D. Control Wiring

1. Control wiring for digital/discrete signal wiring, shall be 600V, minimum 14 AWG, THHN/THWN, copper stranded, unless specifically indicated otherwise.

2. Instrument cable for analog signal wiring (4-20mA DC) shall be shielded, 2-conductor, 300 volt rated, minimum 18 AWG, Belden No. 8760, Alpha Wire, or approved equal. Provide 600 volt rated cable where cable occupies the same enclosure and/or raceway with voltages greater than 300 volt as specified below
3. Single Shielded Pair Instrument Cable
 - a. Tinned copper, XLPE insulated stranded conductors, 18 AWG minimum, twisted pair with overall shield, stranded tinned 18 AWG copper drain wire and overall PVC jacket. Rated for 600 volts minimum and conforming to UL 1581. Cables shall be rated for tray cable (TC) use where installed within a cable tray.
1. Multi-paired Shielded Instrument Cable
 - a. Tinned copper, XLPE insulated stranded conductors, No. 16 AWG minimum, twisted pairs with shield over each pair, stranded tinned No. 18 AWG copper drain wire, and overall PVC outer jacket. Rated for 600 volts minimum and conforming to UL 1581 or UL 13. Cables shall be rated for tray cable "TC" use where installed within a cable tray.

E. Splices

1. No. 10 and smaller with 600-volt pressure type insulated connector of wire-nut type, or equal; soldered and crimped type not allowed. Ideal type wire nut Buchanan type B-Cap and Minnesota Mining (3M) type Scotchlok.
2. No. 8 and larger with solderless lugs or solderless connectors of lock-tite or similar type properly taped with plastic insulating tape, Minnesota Mining Co. #33, or equal, then two half-lap servings of friction tape, Manson, or equal.
3. Wire connector systems for use with underground conductors shall be UL listed specifically for such use
4. Service entrance conductors shall be installed without splices. Electrical equipment feeders shall be spliced only where shown or specifically approved. Control and metering conductors shall be installed without splices.
5. All splices shall be made only by specific permission of the Engineer and then only in manholes or pull boxes and shall be sealed watertight with a heat-shrunk insulation.
6. Tighten electrical connectors and terminals in accordance with manufacturer's published torque tightening values. Where manufacture's

torqueing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standards 486A and 486B.

7. Use UL listed splice for all underground wires, ducts buried, in conduit and in ducts. Connectors and splices shall be waterproof.

2.02 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 WIRE AND CABLE INSTALLATION

- A. All wire and cables shall be installed in conduit of size and type indicated on the Drawings and Specifications.
- B. Install electrical cables, wires, and connectors in compliance with NEC.
- C. Pull conductors simultaneously where more than one is being installed in same raceway. Use UL listed pulling compound or lubricant, where necessary.
- D. Use pulling means including, fish tape, cable, rope, and basket weave wire/cable grips, which will not damage cables or raceways. Do not use rope hitches for pulling attachment to wire or cable.
- E. Conceal all cable in finished spaces.
- F. Install exposed cable parallel and perpendicular to surfaces or exposed structural members, and follow surface contours, where possible.
- G. Conductors shall be sized such that voltage drop does not exceed 3 percent for branch circuits or 5 percent for feeder/branch circuit combination.
- H. Provide adequate length of conductors within electrical enclosures and train the conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than 10 AWG cabled in individual circuits. Make terminations so there is no bare conductor at the terminal.
- I. All feeder and branch circuit wiring shall be color coded at all termination and splice locations. System neutrals shall be designated in addition to phase conductors. Equipment grounds shall be green.
- J. The number of conductors shown on the Drawings is not necessarily the correct number required. As many conductors as are required in each case shall be installed. In general, grounding conductors are not scheduled.

- K. In general, wiring for the following systems shall be installed in separate conduits. Do not mix categories in a single raceway.
1. 120 volt power wiring
 2. 120 volt control wiring, including, digital input and output signals
 3. 24 volt DC control wiring, including, digital input and output signals
 4. 24 volt DC analog control wiring (4-20mA)
 5. Communications wiring
 6. Special & Emergency Systems
- L. Conductors 600 volts and below shall be color coded in accordance with the following:

CONDUCTOR	120 / 208 COLOR	480 / 277 COLOR
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	White / Gray
Equipment Grounds	Green	Green

3.02 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.
- B. The Contractor shall test each electrical circuit after permanent cables are in place with terminators installed, but before cable or wire is connected to equipment or devices to demonstrate that each circuit is free from improper grounds and short circuits.
- C. The Contractor shall Megger Test the insulation resistance between phases and from each phase to ground for each of the following feeder and motor branch circuits:
1. Power Distribution Equipment
 2. Motors
- D. The Megger Testing shall be witnessed by the Engineer. The Engineer shall be notified at least 48 hours in advance of testing.

- E. Measure the insulation resistance with a digital Megger insulation testing instrument in accordance with manufacturer's recommendations. All test instruments are to be provided by the Contractor.
- F. If any insulation resistance measures less than 50 megohms, the cable shall be considered faulty with the cable failing the insulation test. In moist environments, bag the ends of the cable to prevent a faulty Megger test.
- G. Any cable which fails the insulation tests or which fails when tested under full load conditions shall be replaced with new cable for the full length and retested at no additional cost to Owner.
- H. The below grade service or feeder splice shall be water immersion Megger tested in the presence of the Engineer. Each splice shall be immersed in a grounded water immersion bath for 24 continuous hours prior to and during the test. Criteria for failure shall be as described for cable above.

3.03 STARTUP & COMMISSIONING

- A. Provide in accordance with Division 01 General Requirements.

3.04 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

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SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 SUMMARY

- A. Provide all labor, tools, equipment, materials and appurtenances necessary to furnish and install grounding materials in accordance with the Drawings and as specified herein. This section includes solid grounding of electrical systems and equipment.

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Unless otherwise noted, the most recent version of the listed publications, including revisions, at time of bid opening shall apply.
- B. NATIONAL ELECTRICAL CODE (NEC), as applicable to electrical grounding and bonding, Art. 250.
- C. UNDERWRITERS' LABORATORIES, INC. (UL)
 - 1. UL 467 Electrical Grounding and Bonding Equipment
- D. INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE)
IEEE 81 AND 142
 - 1. 81-2012 IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounded System (Part 1)
 - 2. 141-1993 IEEE Recommended Practice for Electric Power Distribution for Industrial Plants
 - 3. 142-2007 IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. All submittals shall have pertinent numerical data and information specified in the "English" language using "English" units. The submittals shall include but are not limited to the following in addition to Division 01 General Requirements.
- C. Product Data
 - 1. Provide product data for all grounding equipment and appurtenances, including but not limited to; wires, connectors, lugs, clamps, ground rods, bonding jumpers and accessories.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Provide each electrical grounding system with assembly of materials required for complete installation including wires/cables, connectors, lugs, clamps, ground rods, bonding jumpers and accessories.
- B. Provide electrical grounding conductors for grounding connections matched to power supply wiring materials and sized according to NEC.
- C. Provide electrical connectors, lugs, clamps, bonding jumpers and accessories as recommended by the respective manufacturer for the particular application, unless other indicated.
- D. Ground Rods: Solid copper clad, 3/4-inch diameter by 10 feet long.
- E. Insulated Conductors: Green in color.

- F. Ground Bus. Bare annealed copper bars of rectangular cross section, 1/4-inch x 3-inch x length as required, with 98 percent conductivity, rigidly attached to structure.
- G. Bonding Strap Conductor/Connectors: Soft copper, 0.05 inch thick and 2-inches wide, except as indicated.
- H. Pressure Connectors: High conductivity plated units.
- I. Bolted Clamps: Heavy-duty units listed for the application.
- J. Exothermic Welded Connections: Provided in kit form and selected for the specific types, sizes, and combinations of conductors and other items to be connected.

2.02 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 GROUNDING & BONDING

- A. Ground main service entrance ground bus or lug to neutral of incoming service, to enclosure, to building steel, to ground rods/grounding ring, to rebar in concrete footing, and to main cold water pipe. Install grounding bushings or service conduits. Use exothermic style ground connections to the ground rods and building steel.
- B. Use of conduit system for ground conductor shall not be allowed.
- C. Provide and install 600 volt insulated bonding conductors throughout the distribution system with connection to bonding (or grounding) terminal on each panel and panel board with connections to other equipment where specifically indicated and noted.
- D. Bonding conductors shall be continuous where possible. Where splices are required, provide compression connectors of approved pattern. Insulate connectors to equivalent thickness of conductors.
- E. Provide grounding system for grounded circuit conductors of dry type transformer secondaries in accordance with NEC. Use exothermic style ground connections to building steel. Enclose grounding conductors in schedule 40 PVC conduit.
- F. Provide equipment grounding conductors in all conduits containing power, control, or instrumentation conductors on the load side of the service equipment or on the load side of a separately derived system.

- G. Comply with NEC Article 250 for sizes and quantities of equipment grounding conductors, except that larger sizes indicated or shown on the Contract Documents shall take precedence. Use of metallic conduit systems for equipment grounding as recognized by the NEC shall not be permitted under this specification.
- H. Install grounding bushings on conduits at both primary and secondary entrances to transformers. Ground transformer enclosures to bushings.
- I. Install bonding jumper for flexible metal conduit unless fittings are approved for grounding or otherwise comply with NEC.
 - 1. Size jumper to match over-current device.
 - 2. Green insulation.
 - 3. Connect to grounding bushing at each end.
- J. Ensure that entire electrical system is electrically continuous and permanently and effectively grounded, including all electrical equipment and motors.
 - 1. Locate ground rods with a minimum of two rod length from each other and at least the same distance from any other grounding electrode. Connect ground conductors to ground rods by means of exothermic welds except at test wells and as otherwise indicated. Drive rods until tops are 24 inches below finished floor or final grade except as otherwise indicated.
- K. Route grounding electrode conductors along the shortest and straightest paths possible without obstructing access or placing conductors where they may be subjected to strain, impact, or damage, except as indicated.
- L. Ensure that grounding electrode conductor connections to interior piping, structural members, and the like are accessible for periodic inspection during the life of the structure.

3.02 BONDING FOR OTHER TRADES

- A. Signal raceways, water piping, heating piping and metallic air ducts shall be bonded together and to the grounding conductor with No. 8 soft drawn bare solid conductors. Connections to pipes shall be made with cast clamps of like material as the pipes to which attached, to ducting terminated in a secure manner by best practical means, bonding across any flexible or insulated connections.
- B. All bonding conductors shall be installed in a neat manner properly shaped for contour of surface involved and properly supported. At locations remote from the main service entrance panel boards, bond to the largest raceway nearby.

3.03 FIELD TESTING

- A. Provide the services of an independent Testing Agency to perform the specified tests for the following systems:
 - 1. Ground resistance. The Testing Company shall perform all testing in accordance with National Electrical Testing Association (NETA) standards and procedures. All testing results shall be submitted on NETA forms and the testing data shall be certified by the respective Agency. Test results shall indicate recommended action for a sub-par test results. Results shall list recommended test values that should be obtained for new installation.
- A. Measure ground resistance without the soil being moistened by any means other than natural precipitation or natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests by the three-point fall of potential method in accordance with Section 9.03 of IEEE 81. Simple moisture addition is not acceptable.
- B. Ground/resistance maximum values shall be as follows:
 - 1. Equipment rated 500 kVA and less: 10 ohms.
 - 2. Equipment rated 500 kVA to 1000 Kva: 5 ohms.
 - 3. Equipment rated over 1000 kVA: 3 ohms.
 - 4. Unfenced substations and pad mounted equipment: 5 ohms.
 - 5. Fence Grounds: 10 ohms.
- C. Where ground resistances exceed specified values, and if directed, modify the grounding system to reduce resistance values.

3.04 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.05 STARTUP & COMMISSIONING

- A. Provide in accordance with Division 01 General Requirements.

3.06 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

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SECTION 26 05 33

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Provide the labor, tools, equipment, and materials necessary to furnish and install raceways, boxes, and supporting devices in accordance with the Plans and applicable reference standards listed in Article 1.03.
- B. Types of products specified in this section include
 - 1. Conduit, Raceways & Fittings
 - 2. Supporting Devices
 - 3. Boxes and Fittings
- C. Related Requirements
 - 1. Division 26: Section 26 05 00 COMMON WORK RESULTS FOR ELECTRICAL

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 REFERENCES

- A. Reference Standards
 - 1. Underwriters Laboratories, Inc. (UL) Listing and Labeling. Items provided under this section shall be listed and labeled by UL
 - 2. National Electrical Code (NEC)
 - 3. National Electrical Manufacturers Association (NEMA)

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.
- B. Furnish manufacturer's product data, test reports, and material certifications as required.
- C. Product data for cabinets and enclosures.
- D. Shop Drawings for floor boxes and boxes, enclosures and cabinets that are to be shop fabricated (non-stock items)

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Division 01 General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Division 01 General Requirements.

1.08 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 CONDUIT, RACEWAYS & FITTINGS

- A. Provide conduit with 3/4-inch diameter minimum, except where specifically shown smaller on the Drawings.
- B. Conduit, connectors, and fittings shall be approved for the installation of electrical conductors.
- C. Refer to Table 3.01A for approved conduit installation guidelines.
 - 1. Electrical Metallic Tubing (EMT)
 - a. EMT shall be rigid metallic conduit of the thin wall type in straight lengths, elbows, or bends and must conform to NEMA C80.3 and the requirements of UL 797.
 - b. Couplings and connectors shall be steel compression fittings. Where EMT enters outlet boxes, cabinets, or other enclosures, connectors must be the insulated-throat type, with a locknut. Fittings must meet the requirements of NEMA FB 1.
 - 2. Rigid Galvanized Steel Conduit

- a. Rigid steel conduit (RGS), including couplings, elbows, bends, and nipples, shall conform to the requirements of UL 6 and NEMA C80.1 Steel fittings shall be galvanized by the hot-dip process.
 - b. Fittings for rigid steel conduit shall be threaded and shall conform to NEMA FB 1.
 - c. Gaskets shall be solid for fittings sized 1-1/2 inches and less. Conduit fittings with blank covers shall have gaskets except in clean, dry areas or at the lowest point of a conduit run where drainage is required.
 - d. Covers shall have captive screws and be accessible after the Work has been completed.
3. Rigid Aluminum Conduit
- a. RAC, including couplings, elbows, bends, and nipples, shall conform to the requirements of UL 6 and ANSI C80.5.
 - b. Fittings for rigid aluminum conduit shall be threaded and shall conform to NEMA FB 1. Fittings shall be galvanized by the hot dip process, unless manufacturer dictates aluminum for specific application.
 - c. Gaskets shall be solid for fittings sized 1-1/2 inches and less. Conduit fittings with blank covers shall have gaskets except in clean, dry areas or at the lowest point of a conduit run where drainage is required.
 - d. Covers shall have captive screws and be accessible after the work has been completed.
4. PVC Coated Rigid Metal Conduit
- a. Rigid galvanized metal conduit coated with 40 mils thick polyvinylchloride coating.
 - b. Fittings, elbows, supporting devices and accessories shall include factory applied 20 mils thick polyvinylchloride coating and be manufactured by the same as that of the conduit.
 - c. Use tools as recommended by the manufacturer so as not to damage PVC coating. Where coating is damaged, touch-up with PVC paint in the field after installation.
5. Rigid Plastic Conduit
- a. PVC Schedule 40: Conduit shall be made of polyvinyl chloride compound that shall be homogeneous plastic material free from cracks, holes or foreign inclusions. Conduit shall be rated for use with 90 degree C conductors, UL Listed. Use solvent cement to

join conduits as manufactured the same as the conduit manufacturer.

- b. PVC Schedule 80: Heavy wall PVC conduit that shall be made of polyvinyl chloride compound that shall be homogeneous plastic material free from cracks, holes or foreign inclusions. Conduit shall be rated for use with 90 degree C conductors, UL Listed. Use solvent cement to join conduits as manufactured the same as the conduit manufacturer.

6. Flexible Metallic Conduit

- a. Flexible metallic (FM) conduit shall meet the requirements of UL1.
- b. Liquid tight flexible metallic conduit shall be provided with a protective jacket of PVC extruded over a flexible interlocked galvanized steel core to protect wiring against moisture, oil, chemicals, and corrosive fumes.
- c. Fittings for flexible metallic conduit shall meet the requirements of UL 514B, Type I box connector, electrical, Type III coupling, electrical conduit, flexible steel, or Type IV adapter, electrical conduit.

7. Wireways

- a. Wireways and auxiliary gutters for use in exposed, dry locations shall be a prefabricated channel-shaped sheet metal trough with hinged or removable covers, associated fittings, and supports for housing, and protecting electrical wires and cables in accordance with UL 870.
- b. Straight sections of trough, elbows, tees, crosses, closing plates, connectors, and hanging brackets shall be constructed from sheet steel of commercial quality not less than 16-gage. Sheet metal component parts shall be cleaned, phosphatized, and coated with a corrosion-resistant gray paint.
- c. Straight sections of wireways and auxiliary gutters shall be solid or have knockouts as indicated in both sides and bottom, 3 inches on center.
- d. Straight sections shall be not more than 5-feet long, with covers held closed with screws.

8. Conduit Seals

- a. Provide factory fabricated watertight conduit sealing bushing assemblies suitable for sealing around conduit, or tubing passing through concrete floors and walls. Provide a cast in place water stop wall sleeve with a mechanical pipe seal between the conduit

and the sleeve. Construct seals with steel sleeve, malleable iron body, neoprene sealing grommets or rings, metal pressure rings, pressure clamps, and cap screws.

- b. Provide E.Y.S. seal fittings with appropriate potting material where conduits enter or leave a Class 1, Division 1 or 2 environments or a Class 2, Division 1 or 2 environment, and chemical rooms.

2.02 SUPPORTING DEVICES

- A. Supports, support hardware, and fasteners shall be protected with zinc coating or with treatment of equivalent corrosion resistance using approved alternative treatment, finish, or inherent material characteristic. Products for use outdoors shall be hot dip galvanized unless material is inherently corrosion resistant.
- B. Refer to Table 2.02A for approved supporting device installation guidelines.

1. Conduit Supports

- a. Single run hangers: Galvanized steel conduit straps or clamps, or cast metal beam clamps. Perforated straps and spring steel clips and clamps will not be permitted.
- b. Group run hangers: Minimum 12-gauge galvanized performed U-channel rack with conduit fittings; 25 percent spare capacity
- c. Hanger rods: Threaded steel, 3/8-inch diameter, or as identified on the Drawings
- d. Vertical run supports: Minimum 12-gauge galvanized performed U-channel struts with conduit fittings

2. Equipment and Lighting Supports

- a. 12-gauge galvanized performed U-channel struts with fixture and conduit fittings, as applicable, unless indicated otherwise on the Drawings.

3. Corrosive Area Supports

- a. Clamp Hangers, Pipe Straps, and Clamp Back Spacers for use with PVC-coated rigid metal conduit shall have 40 mil gray PVC exterior coating.
- b. Clamp Hangers, Pipe Straps, etc. for use with PVC nonmetallic conduit shall be of nonmetallic PVC material.
- c. Hanger Rods: 20 mil gray PVC exterior coated rod with threaded ends only 3/8 inch and 1/2 inch sizes as required.
- d. Strut Support: 20 mil gray PVC exterior coating strut. Standard channel, slotted channel, and back to back channel are acceptable.

- e. Provide stainless steel supports and accessories in lieu of PVC coated supports when indicated in Table 2.02A below.

TABLE 2.02A – Supporting Devices

Location/Equipment	Acceptable Support Type
All Locations	Galvanized Steel or Stainless Steel U-Channel

2.03 BOXES AND FITTINGS

- A. Boxes must have sufficient volume to accommodate the number of conductors entering the box in accordance with the requirements of NFPA 70 and UL 514A.
- B. In general, boxes that are exposed to weather, process areas, normally wet locations, and locations exposed in mechanical spaces shall be cast-metal. Boxes in all other finished areas shall be sheet metal. Boxes installed in corrosive areas, such as the chemical feed room, shall be nonmetallic.
- C. Refer to Table 2.03A for approved enclosure types.
 - 1. Sheet Metal Outlet Boxes
 - a. Sheet Metal Outlet Boxes: Standard type galvanized steel, minimum four inch square or octagon by 1-1/2 inch deep.
 - b. Luminaire and Equipment Supporting boxes: Rated for weight of equipment supported; include 2 inch male fixture studs where required.
 - c. Single Wall Type: Minimum size, four inch square by 1-1/2 inch or 2-1/8 inch deep, except as noted. Provide dry wall device covers raised 3/4 inch minimum to insure flush finish mounting.
 - d. Ganged Wall Type: Minimum depth three inches except as noted, ganged as required under common plate to contain devices shown. On 277-volt circuits, ganged boxes for switches shall contain only one circuit or equip box with permanent barriers per NEC Art 404-8.
 - 2. Cast Outlet Boxes
 - a. Type FS shallow and type FD deep, cast ferroalloy
 - b. Provide number of threaded hubs as required.
 - c. Use in all exterior, damp and locations exposed in mechanical spaces.

- d. Provide gasketed cover and accessories by box manufacturer for complete weatherproofing. Provide correct box to accept weatherproof covers as specified.
- 3. Sheet Metal Pull & Junction Boxes
 - a. Sheet metal boxes shall be standard type galvanized steel and must conform to UL 50.
 - b. Box dimensions shall be minimum four inch square or octagon by 2 1/2 inch deep.
 - c. Sizes up to 12 by 12 by 6 inches: Provide screw-type or hinged covers.
 - d. Sizes greater than 12 by 12 by 6 inches: Provide hinged covers.
 - e. Boxes shall be sized to accommodate all incoming raceways.
- 4. Nonmetallic Outlet, Device, and Wiring Boxes
 - a. Conform to NEMA OS 2, Nonmetallic Outlet Boxes, Device Boxes, Covers, and box Supports, and UL 514C, Nonmetallic Outlet Boxes, Flush Device Boxes and Covers. Boxes shall be molded polyvinyl chloride (PVC), or fiberglass units of type, shape, size, and depth to suit location and application.
 - b. Boxes shall be equipped with threaded screw holes for device and cover plate mounting. Each box shall have a molded cover of matching material suitable for the application and location installed.

TABLE 2.03A – Electrical Enclosure Types

Location/Equipment	Acceptable Enclosure Type
Control Room	NEMA 12
All other locations	NEMA 4X Stainless Steel (unless otherwise approved)

2.04 SOURCE QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

PART 3 – EXECUTION

3.01 CONDUIT

- A. Uses Permitted
 - 1. Use liquid tight flexible metal conduit for the final 24 inches of connections to motors or control items subject to movement or vibration.

2. Use RGS for all exterior aboveground installations unless otherwise noted.
3. Use PVC coated rigid steel conduit, or as scheduled below, for installation in corrosive areas, and other areas as identified on the Drawings.
4. Exposed raceways in Manufacturing Areas, Utility Rooms, Mechanical Rooms, Warehouse Areas, etc., shall be Rigid Galvanized Steel below 15 feet.
5. Conduit and raceway runs in finished areas concealed in or behind walls, above ceilings, or exposed on walls and ceilings 15 feet or more above finished floors and not subject to mechanical damage may be electrical metallic tubing (EMT).
6. Use Schedule 40 PVC conduit for exterior direct buried installations. Use Schedule 40 PVC conduit for exterior concrete encased installations. Use Schedule 80 PVC conduit for underground installations under driveways. The transition from underground and from concrete encasement to riser shall be PVC coated rigid steel conduit to a minimum of 12 inches above finished floor and/or finished grade elevation. All elbows shall be prefabricated Rigid Steel to prevent wire burn through. Reference specification 26 05 43 'Underground Ducts and Raceways for Electrical Systems' for further requirements.
7. Install conduit seals for conduit penetrations of slabs on grade and exterior walls below grade and where indicated. Tighten sleeve seal screws until sealing grommets have expanded to form watertight seal. Provide seals for the interior of conduits that penetrate exterior or water bearing walls, consisting of gland type sealing bushings or RTV closed cell silicone foam.
8. Refer to Table 3.01A below for approved conduit types.

TABLE 3.01A – Conduit Types

Location/Equipment	Approved Conduit Type
Control Room	Electrical Metallic Tubing
All other locations	Rigid Galvanized Steel

- B. Power, lighting, control, emergency light and power, and special-service systems and all related components shall be installed in accordance with NFPA 70, and shall be enclosed in separate conduit or separate conduit systems as indicated on the Drawings and as specified herein.
- C. Any run of conduit between outlet and outlet, between fitting and fitting, or between outlet and fitting shall contain no more than the equivalent of three 90-

degree bends, including those bends located immediately at the outlet or fitting. Field bends shall be made in accordance with the manufacturer's recommendations, which normally require use of a one-size-larger bender than would be required for uncoated conduit. Installed conduit and fittings shall be free of dirt and trash and shall not be deformed or crushed. Empty conduit shall have a pull rope stalled.

- D. Conduit shall be installed with a minimum of 3 inches of free air space separation from mechanical piping.
- E. Conduit in finished areas shall be installed concealed. Conduit passing through masonry or concrete walls shall be installed in sleeves. Conduit shall be securely clamped and supported at least every 10 feet vertically and 8 feet horizontally. Galvanized pipe straps shall be fastened to structure with bolts, screws, and anchors. Wooden masonry plugs shall not be used.
- F. Install exposed conduits, parallel or perpendicular to walls, ceilings, or structural members. Do not run through structural members. Avoid horizontal runs within partitions or sidewalls. Avoid ceiling inserts, lights, or ventilation ducts or outlets. Do not run conduits across pipe shafts or ventilation duct openings and keep conduits a minimum of 6 inches from parallel runs of flues, hot water pipes, or other sources of heat. Wherever possible, install horizontal raceway runs above water and steam piping.
- G. Do not run conduits exposed on the exterior surface of buildings. Conduits penetrating exterior walls below grade, at grade floors, or below grade floors shall be sealed to prevent moisture migration. The exterior of the conduit shall be sealed with a mechanical pipe seal. The interior conduit seal shall be a gland type sealing bushing or RTV closed cell silicone foam. Ensure that conduits do not retain water against these seals.
- H. Raceways penetrating fire rated walls, floors, and partitions shall be sealed with a fire rated sealant.
- I. All conduits shall be supported with materials specifically made for this purpose. Do not use wire hangers. Do not attach any parts of the raceway system to ventilation ducts. Conduit supports shall be attached to the building. Support conduits on each side of bends and on a spacing not to exceed the following: 6 feet for conduits smaller than 1 1/4 inches and 8 feet for conduits 1 1/4 inches and larger. Support riser conduits at each floor level with clamp hangers. All underground conduits shall be securely anchored to prevent movement during placement of concrete or backfill. Use precast separators and heavy gauge wire ties or other approved fasteners.
- J. Provide E.Y.S. seal fittings with appropriate potting material where conduits enter or leave a Class 1, Division 1 or 2 environments or a Class 2, Division 1 or 2 environment, and chemical rooms.

- K. Conduit connections to boxes and fittings shall be supported not more than 36 inches from the connection point. Conduit bends shall be supported not more than 36 inches from each change in direction. Conduit shall be installed in neat symmetrical lines parallel to the centerlines of the building construction and the building outline. Multiple runs shall be parallel and grouped whenever possible on common supports. Exposed ends of conduit without conductors shall be sealed with watertight caps or plugs.
- L. Bonding wires shall be used in flexible conduit for all circuits. Flexible conduit shall not be considered a ground conductor.
- M. Liquid tight flexible metallic conduits shall be used in wet and oily locations and to complete the connection to motor-driven equipment.
- N. Electrical connections to vibration-isolated equipment shall be made with flexible metallic conduit in a manner that will not impair the function of the equipment.
- O. A polypropylene pull rope with a tensile strength not less than 130 pounds shall be installed in empty conduit.
- P. Electrical conduit may be embedded in concrete according to the provisions of Article 6.3 of ACI 318 Building Code Requirements for Reinforced Concrete, provided the following conditions are met:
 - 1. Outside diameter of conduit shall not exceed 1/3 of concrete thickness. Maximum conduit outside diameter shall not exceed 3 inches when embedded in slab.
 - 2. Conduit shall not be placed closer than three diameters on center. Route conduit to minimize crossing of different conduit runs.
 - 3. Conduit shall not be embedded in structural concrete slabs less than four inches thick.
 - 4. A 1-1/2 inch minimum concrete cover shall be provided for conduits in structural concrete slabs.
- Q. Installation of Underground Conduit
 - 1. Minimum of 3/4 inch conduit in or under concrete slab on grade.
 - 2. Where conduits are installed in concrete slabs, on the ground, underground, or exposed to the weather, make all joints liquid tight and gas tight.
 - 3. Bury all underground conduit, except under concrete slabs placed on fill, to a depth of at least 30 inches below finished grade unless otherwise indicated on the Drawings .

4. Slope ducts to drain away from buildings into manholes and/or handholes. Adjust final slopes to coordinate with existing Site utilities.
5. Install on undisturbed soil where possible. Concrete encase conduits as shown on Drawings. Use pit run gravel and sand, placed 8-inch lifts and compacted for backfill.

R. Installation of Rigid Metal Conduit

1. Ends of conduit shall be cut square, reamed and threaded, and joints shall be brought butt-to-butt in the couplings. Joints shall be mechanically tight. Conduit shall be protected against damage and the entrance of water or foreign material during construction.
2. Ninety-degree bends of conduit with a diameter larger than 1 inch shall be made with factory-made elbows. Conduit elbows larger than 2 1/2 inches shall be long radius. Field-made bends and offsets shall be made with an approved hickey or conduit-bending machine. Changes in directions of runs shall be made with symmetrical bends or cast-metal fittings.
3. At connections to sheet metal enclosures and boxes, a sufficient number of threads shall project through to permit the bushing to be drawn tight against the end of the conduit, after which the locknut shall be pulled up sufficiently tight to draw the bushing into firm electrical contact with the box. Conduit shall be fastened to sheet metal boxes and cabinets with two locknuts where required by NFPA 70 where insulating bushings are used, where bushings cannot be brought into firm contact with the box, and where indicated.
4. Conduit joints shall be made with tapered threads set firmly. Each length of conduit cut in the field shall be reamed before installation. Where conduit is threaded in the field, each threaded end shall consist of at least five full threads. Corrosion-inhibitive compound (cold galvanizing paint) shall be used on all conduit threads or any locations where the original hot galvanized surface has been compromised.
5. Conduit stubbed-up through concrete floors for connections to free-standing equipment except motor-control centers, cubicles, and other such items of equipment shall be provided with a minimum of a 12 inch riser above the floor slab is of sufficient thickness; if not, a floor box shall be provided and set flush with the finished floor. Conduits installed for future use shall be terminated with a coupling and plug set flush with the floor.

3.01 SUPPORTING DEVICES

- A. Install supporting devices to fasten electrical components securely and permanently in accordance with NEC requirements.

- B. Coordinate with the building structural system and with other electrical installations.
- C. Conform to manufacturer's recommendations for selection and installation of supports.
- D. Install individual and multiple (trapeze) raceway hangers and riser clamps as necessary to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assembly and for securing hanger rods and conduits.
- E. Support parallel runs of horizontal raceways together on trapeze type hangers.
- F. Support individual horizontal raceways by separate pipe hangers. Spring steel fasteners may be used in lieu of hangers only for 1 1/2 inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings only. For hanger rods with spring steel fasteners, use 1/4 inch diameter or larger threaded steel. Use spring steel fasteners that are specifically designed for supporting single conduits or tubing.
- G. In vertical runs, arrange support so the load produced by the weight of the raceway and the enclosed conductors is carried entirely by the conduit supports with no weight load on raceway terminals.
- H. Support miscellaneous electrical components as required to produce the same structural safety factors as specified for raceway supports. Install metal channel racks for mounting cabinets, panelboards, disconnects, control enclosures, pull boxes, junction boxes, transformers, and other devices.
- I. Install sleeves in concrete slabs and walls and all other fire rated floors and walls for raceways and cable installations. For sleeves through fire rated wall or floor construction, apply UL listed fire-stopping sealant in gaps between sleeves and enclosed conduits and cables.

3.02 BOXES AND FITTINGS

- A. Pullboxes shall be furnished and installed where necessary in the conduit system to facilitate conductor installation. Conduit runs longer than 100 feet or with more than three right angle bends shall have a pull box installed at a convenient intermediate location.
- B. Boxes and enclosures shall be securely mounted to the building structure with supporting facilities independent of the conduit entering or leaving the boxes.
- C. Bonding jumpers shall be used around concentric or eccentric knockouts.
- D. Installation of Outlet Boxes

1. Use nonmetallic boxes in corrosive areas such as chemical feed area and as designated on the Plans.
2. Use explosion proof boxes in Hazardous areas as identified on the Drawings.
3. Use cast metal boxes in all other locations. Each box with associated covers and fittings shall have a NEMA rating for each location installed.

E. Installation of Pull and Junction Boxes

1. Use general-purpose boxes (NEMA 1) in finished areas with framed construction.
2. Use dust-tight and oil-tight boxes (NEMA 12) in other dry interior areas.
3. Use explosion proof boxes (NEMA 7) in hazardous areas as designated on the Plans.
4. Use watertight boxes (NEMA 4) for exterior and wet locations on outdoor structure where moisture is present.
5. Use corrosion resistant watertight boxes (NEMA 4X) for wet locations and corrosion filled areas, such as the chemical feed area, and as identified on the Drawings.

3.03 FIELD QUALITY CONTROL

- A. Provide in accordance with Division 01 General Requirements.

3.04 STARTUP & COMMISSIONING

- A. Provide in accordance with Division 01 General Requirements.

3.05 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

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SECTION 26 28 16

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes individually mounted enclosed switches and circuit breakers used for the following:
 - 1. Service disconnecting means.
 - 2. Feeder and branch-circuit protection.
 - 3. Motor and equipment disconnecting means.

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and payment requirements: per Division 01 General Requirements.

1.03 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Division 26, Section 26 05 00 COMMON WORK RESULTS FOR ELECTRICAL
- C. Division 26, Section 26 05 26 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1.05 SUBMITTALS

- A. Product Data: For each type of switch, circuit breaker, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each switch and circuit breaker.
 - 1. Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings. Include the following:

- a. Enclosure types and details.
 - b. Current and voltage ratings.
 - c. Short-circuit current rating.
 - d. UL listing for series rating of installed devices.
 - e. Features, characteristics, ratings, and factory settings of individual over-current protective devices and auxiliary components.
 - f. Time-current curves, including selectable ranges for each type of circuit breaker.
2. Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
- C. Field Test Reports: Submit written test reports and include the following:
 1. Test procedures used.
 2. Test results that comply with requirements.
 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- D. Manufacturer's field service report.
- E. Maintenance Data: For enclosed switches and circuit breakers and for components to include in maintenance manuals specified in Division 01. In addition to requirements specified in Division 01 Section 01 70 00 EXECUTION & CLOSEOUT REQUIREMENTS include the following:
 1. Routine maintenance requirements for components.
 2. Manufacturer's written instructions for testing and adjusting switches and circuit breakers.
 3. Time-current curves, including selectable ranges for each type of circuit breaker.

1.06 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NEMA AB 1 and NEMA KS 1.
- C. Comply with UL #98, Enclosed Switches and UL #508, Industrial Control Equipment.

- D. Federal Specification W-S-865- Heavy Duty Switches
- E. Comply with NFPA 70.
- F. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:
- B. Ambient Temperature: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 104 deg F (40 deg C)
- C. Altitude: Not exceeding 6600 feet (2000 m)

1.08 COORDINATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.09 SITE CONDITIONS

- A. Existing Conditions: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Square D Co.
- C. Eaton Corp.; Cutler-Hammer Products
- D. General Electric Co.; Electrical Distribution & Control Division
- E. Approved Equal

2.02 ENCLOSED SWITCHES

- A. Enclosed, Non-fusible Switch: NEMA KS 1, heavy duty type with lockable handle. NEMA 4X Stainless Steel Enclosure for equipment located in the upper level garage area and lower level compactor area.
- B. Rating: Voltage and number of poles as required for motor or equipment circuits being disconnected. Switches used for service entrance equipment shall bear a UL label and be rated for service entrance equipment.
- C. Enclosed, Fusible Switch, 800A and Smaller: NEMA KS 1, heavy duty type with clips to accommodate specified fuses, lockable handle with two padlocks, and interlocked with cover in closed position. NEMA 4X Stainless Steel Enclosure for equipment located in the upper level garage area and lower level compactor area.
- D. Double Throw Safety Switches shall be unfused double throw with center OFF position, quick make, quick break mechanism, visible blades in the OFF position and safety handle. Rating, voltage and number of poles as required for the circuits being disconnected

2.03 ENCLOSED CIRCUIT BREAKERS

- A. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable instantaneous, magnetic trip setting for circuit-breaker frame sizes 150 Amp through 400 Amp.
- B. Molded-Case Circuit-Breaker Features and Accessories: Standard frame sizes, trip ratings, and number of poles. Lugs shall be mechanical style suitable for number, size, trip ratings, and material of conductors.
- C. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.
- D. Electronic Trip Unit Circuit Breakers (Frame sizes 400 Amp and larger): RMS sensing, interchangeable harmonic trip unit, LED trip indicators with the following field-adjustable settings:
 - 1. Long-time pickup levels and adjustments (L)
 - 2. Short-time pickup levels adjustments (S)
 - 3. Instantaneous trip adjustments (I)
 - 4. Ground fault pickup level, time delay, I₂t response and adjustments (G)

- E. The circuit breaker operating handle shall be externally operable with the operating mechanism being an integral part of the box, not the cover. Provisions for padlocking the circuit breaker in the OFF position shall be provided. Enclosures shall have a dual cover interlock mechanism to prevent unintentional opening of the enclosure cover when the circuit breaker is ON and prevent turning the circuit breaker ON when the enclosure cover is open. The cover interlock mechanism shall have an externally operated override but the override shall not permanently disable the interlock mechanism. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.

2.04 DOUBLE THROW SAFETY SWITCHES

- A. Unfused, double throw with center OFF position, quick make, quick break mechanism, visible blades in the OFF position and safety handle. Rating, voltage and number of poles as required for the circuits being disconnected.

2.05 ENCLOSURES

- A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.
 - 1. Outdoor Locations: NEMA Type 4
 - 2. Corrosive Locations: NEMA Type 4X, stainless steel
 - 3. Wet, Damp and Dirty Locations: NEMA Type 4X, stainless steel
 - 4. Control Rooms/ Finished Areas: NEMA Type 12
 - 5. Reference Section 26 05 33 RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS for approved enclosure types for each area of installation.

2.06 FACTORY FINISHES

- A. Manufacturer's standard prime-coat finish ready for field painting.
- B. Finish: Manufacturer's standard grey paint applied to factory-assembled and -tested enclosures before shipping.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Mount equipment so that sufficient access and working space is provided for ready and safe operation and maintenance.
- B. Securely fasten equipment to walls or other structural surfaces on which they are mounted. Provide independent galvanized steel supports where no wall or other structural surface exists
- C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- D. Install in conformance with National Electrical Code.

3.03 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 26.
- B. Enclosure Nameplates: Label each enclosure with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.
- C. For double throw switches identify source of each service identify source of each service.

3.04 CONNECTIONS

- A. Install equipment grounding connections for switches and circuit breakers with ground continuity to main electrical ground bus.
- B. Install power wiring. Install wiring between switches and circuit breakers, and control and indication devices.
- C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.05 FIELD QUALITY CONTROL

- A. Testing: After installing enclosed switches and circuit breakers and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
- B. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.

- C. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3.06 CLEANING

- A. On completion of installation, inspect interior and exterior of enclosures. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

3.07 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Division 01 General Requirements.

END OF SECTION

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