

PROJECT MANUAL
FOR
**NEUSE RIVER RESOURCE RECOVERY FACILITY
BNR BASINS MCC REPLACEMENT**

CIVIL



Raleigh Project No. WWP-2026-117
BV Project No. 424744

8500 BATTLE BRIDGE ROAD
RALEIGH, NC 27610

AUGUST 2026

ISSUED FOR BID

ELECTRICAL



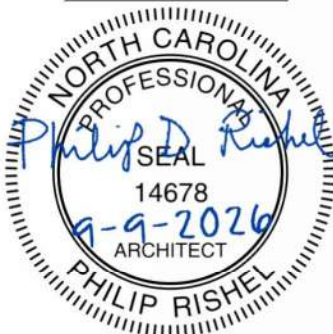
STRUCTURAL



INSTRUMENTATION



ARCHITECTURAL



BLACK & VEATCH

Black & Veatch International Company
Business License F-0794
175 Regency Woods Place, Suite 200
Cary, North Carolina 27518

This page intentionally left blank.

TABLE OF CONTENTS

SECTIONS	PAGES
DIVISION 00 — PROCUREMENT AND CONTRACTING REQUIREMENTS	
00100 - Advertisement for Bids	2
00200 - Instructions to Bid	11
00409 - Bidders Checklist	1
00410 - Bid Form	7
00430 - Bid Bond Penal Sum Form	2
00433 - Proposed Subcontractors Form	1
00441 - Affidavit of Organization	2
00442 - Poor Performance Policy	2
00443 - Non-Collusive Affidavit	1
00444 - Intrusion Beyond Project Limits	1
00510 - Notice of Award	1
00520 - Agreement	14
00550 - Notice to Proceed	1
00610 - Performance Bond	4
00615 - Payment Bond	4
00617 - Affidavit	1
00618 - Certificate of Insurance	1
00620 - Application for Payment	7
00625 - Certification of Substantial Completion	1
00634 - Power of Attorney	3
00700 - General Conditions EJCDC 2018	75
00800 - Supplementary Conditions	37
00805 - Sales Tax Form Procedure for Raleigh Contracts	5
00810 - Dispute Rules State 2002	9
00940 - Work Change Directive	1
00941 - Change Order	2
00942 - Field Order	1
00999 - Contractor Memorandum of Understanding	3
DIVISION 01 — GENERAL REQUIREMENTS	
01 11 13 - Work Covered by Contract Documents	11
01 12 16 - Maintenance of Plant Operations	6
01 32 00 - Construction Progress Documentation	3
01 32 16 - Construction Progress Schedule	14
01 33 00 - Submittal Procedures	7
01 33 00 F1 - F1 Submittal Identification and Contractor's Approval Statement	
01 33 00 F2 - F2 Submittal Identification and Contractor's Approval Statement	
01 42 13 - Abbreviations and Acronyms	7
01 45 00 - Quality Control	5
01 45 33 - Code Required Special Inspections and Procedures	14
01 45 33.2 - Appendix C (Statement of Special Inspections)	51
01 50 00 - Temporary Facilities and Controls	9

Table of Contents

01 61 00 - General Equipment Stipulations	12
01 65 00 - Product Delivery Requirements	2
01 66 00 - Product Storage and Handling Requirements	3
01 67 00.2 - Meteorological and Seismic Design Criteria	16
01 68 00 - Equipment and Valve Identification	5
01 73 19 - Equipment Installation	4
DIVISION 02 — EXISTING CONDITIONS	
02 41 00 - Demolition	5
DIVISION 03 — CONCRETE	
03 30 53.2 - Miscellaneous Cast-in-Place Concrete (20 cy)	9
DIVISION 05 — METALS	
05 50 00 - Miscellaneous Metal Fabrications	11
05 81 00 - Anchorage in Concrete	8
DIVISION 10 — SPECIALTIES	
10 99 00 - Miscellaneous Specialties	2
DIVISION 13 — SPECIAL CONSTRUCTION	
13 14 00 - Pre-Fabricated Metal Building	13
DIVISION 26 — ELECTRICAL	
26 05 11 - Electrical	30
26 05 83 - Electrical Equipment Installation	5
26 24 23 - 600 Volt Class Motor Control Centers	11
DIVISION 31 — EARTHWORK	
31 23 11 - Excavation and Fill for Structures	24
31 23 11 F1 - Temporary Earth Retention Design Certificate - Figure 1	1
DIVISION 40 — PROCESS INTEGRATION	
40 61 11 - Instrumentation and Control System	13
40 61 11 S01 - Input Output List	1
40 61 11A - CITI Proposal 000053	4
40 66 11 - Process Control Network Systems	6
40 66 34 - Fiber Optic Communication Cable and Equipment	22
40 67 11 - Panels Consoles and Appurtenances	10

ADVERTISEMENT FOR BIDS
POSTED: SEPTEMBER 18, 2026
CITY BID NUMBER: 274-BMC

Project: Neuse River Resource Recovery Facility BNR Basins MCC Replacement

Owner: City of Raleigh, North Carolina, Raleigh Water, One Exchange Plaza, P.O. Box 590, Raleigh, NC 27601
Contact: Dan Williams, Dan.Williams@raleighnc.gov

Engineer: Black & Veatch International Company, 175 Regency Woods Place, Suite 200, Cary, North Carolina 27518
Contact: Amaryllis Chavez, ChavezA@bv.com

Sealed Bids will be received until Wednesday, October 21, 2026 at 2:00 PM, at the Neuse River Resource Recovery Facility (NRRRF) Administration Building, 8500 Battle Bridge Road, Raleigh, NC 27610 at which time and place bids will be publicly opened and read aloud for the construction of the NRRRF BNR Basins MCC Replacement project.

After Bids are opened, the Owner shall evaluate them in accordance with the methods and criteria set forth in the Bid Proposal Form. The Owner/City Council reserves the right to waive any informality or to reject any or all Bids. Unless all Bids are rejected, Award will be made to the lowest responsible and responsive Bidder, taking into consideration quality, performance and the time specified in the Bid Form for the performance of the Contract.

A Mandatory Pre-Bid Meeting will be held at 11:00 AM on October 6, 2026 at the NRRRF Administration Building followed by a site walk.

The Project consists generally of the following major items:

- Demolition and in-kind replacement of MCC-P4B, MCC-P5B, and MCC-P6B.
- Demolition and replacement of PLC-81, PLC-82, and PLC-83 cabinets.
- New prefabricated metal enclosure with walls, roof, doors, lighting, and HVAC system to house new MCC and PLC.
- Extension of existing concrete foundation to accommodate new enclosure footprint.
- Demolition and replacement of all power wire cable within existing conduit from each MCC to each motor and device on BNR Aeration Basins 1-6.
- Demolition and replacement of sections of corroded electrical conduit from each MCC to each motor and device on BNR Aeration Basins 1-6.

Bidding Documents may be examined at Engineer's office and at: ConstructConnect, online; McGraw Hill Dodge Company, online; Construction Journal, online; and NC Institute of Minority Economic Development (a.k.a. The Institute), online.

With each request for Bidding Documents supply the following information: Company name, contact person, street address, phone number, and email address for Bidding point of contact; N. C. contractor's license with limitation and classification; indicate if the firm will be a Prime bidder, Supplier or Sub-Contractor.

Bidders will be required to show evidence that they are licensed to perform the work in the Bidding Documents as required by North Carolina General Statute, Chapter 87 and the Instruction to Bidders.

Bid Security in the amount of five percent (5%) of the Bid must accompany each Bid and shall be subject to the conditions provided in the Instruction to Bidders.

City of Raleigh

Janet Cowell, Mayor

END OF DOCUMENT

INSTRUCTIONS TO BIDDERS
TABLE OF ARTICLES

	Page
Article 1 – Defined Terms	1
Article 2 – Copies of Bidding Documents	2
Article 3 – Qualifications of Bidders	2
Article 4 – Examination of Bidding Documents, Other Related Data, and Site	3
Article 5 – Pre-Bid Conference	5
Article 6 – Site and Other Areas	5
Article 7 – Interpretations and Addenda	5
Article 8 – Bid Security	5
Article 9 – Contract Times	6
Article 10 – Liquidated Damages.....	6
Article 11 – “Or-Equal” Items	6
Article 12 – Subcontractors, Suppliers and Others.....	7
Article 13 – Preparation of Bid	7
Article 14 – Basis of Bid; Comparison of Bids	8
Article 15 – Submittal of Bid	9
Article 16 – Modification and Withdrawal of Bid	9
Article 17 – Opening of Bids	10
Article 18 – Bids to Remain Subject to Acceptance	10
Article 19 – Evaluation of Bids and Award of Contract	10
Article 20 – Contract Security and Insurance	11
Article 21 – Signing of Agreement	11
Article 22 – Sales and Use Tax	11

ARTICLE 1 – DEFINED TERMS

- 1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:
- A. *Issuing Office* – The office from which the Bidding Documents are to be issued and which registers plan holders.

ARTICLE 2 – COPIES OF BIDDING DOCUMENTS

- 2.01 Complete sets of the Bidding Documents in the number and for the deposit sum, if any, stated in the Advertisement For Bids may be obtained by registering with the Issuing Office as identified in the advertisement.
- 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.
- 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.
- 2.04 Plan rooms (including construction information subscription services, and electronic and virtual plan rooms) may distribute the Bidding Documents or make them available for examination. Those prospective bidders that obtain an electronic (digital) copy of the Bidding Documents from a plan room are encouraged to register as plan holders from the Bidding Documents Website or Issuing Office. Owner is not responsible for omissions in Bidding Documents or other documents obtained from plan rooms, or for a Bidder's failure to obtain Addenda from a plan room.
- 2.05 *Electronic Documents*
 - A. When the Bidding Requirements indicate that electronic (digital) copies of the Bidding Documents are available, such documents will be made available to the Bidders as Electronic Documents in the manner specified.
 - 1. Bidding Documents will be provided in Adobe PDF (Portable Document Format) (.pdf) that is readable by Adobe Acrobat Reader. It is the intent of the Engineer and Owner that such Electronic Documents are to be exactly representative of the paper copies of the documents. However, because the Owner and Engineer cannot totally control the transmission and receipt of Electronic Documents nor the Contractor's means of reproduction of such documents, the Owner and Engineer cannot and do not guarantee that Electronic Documents and reproductions prepared from those versions are identical in every manner to the paper copies.
 - B. Unless otherwise stated in the Bidding Documents, the Bidder may use and rely upon complete sets of Electronic Documents of the Bidding Documents, described in Paragraph 2.05.A above. However, Bidder assumes all risks associated with differences arising from transmission/receipt of Electronic Documents versions of Bidding Documents and reproductions prepared from those versions and, further, assumes all risks, costs, and responsibility associated with use of the Electronic Documents versions to derive information that is not explicitly contained in printed paper versions of the documents, and for Bidder's reliance upon such derived information.

ARTICLE 3 – QUALIFICATIONS OF BIDDERS

- 3.01 Bidders are notified that relevant Articles of Chapter 87 of the General Statutes of North Carolina, will be observed in receiving and awarding contracts. Bidders for this Project must be properly licensed for the Work.

- 3.02 To demonstrate Bidder's qualifications to perform the Work prior to award, within 5 days of Owner's request, Bidder shall submit written evidence such as financial data, previous experience, present commitments, and such other data as may be called for below.
- A. Evidence of Bidder's authority to do business in the state where the Project is located.
 - B. Bidder's state contractor license number.
 - C. Official name of Bidder and length of time the organization has been in business under present name.
 - D. Address, phone and fax numbers of main place of business. Address and phone numbers of company office that will manage the Project if different than above.
 - E. Officers of the company. Name and resume of designated project manager and field superintendent. Number of regular employees of the organization.
 - F. Latest financial statement showing assets and liabilities of the company.
 - G. Name and home office address of the Surety proposed and the name and address of the responsible local claim agent.
 - H. Listing of completed projects of similar size and type in the last 5 years. Provide name and phone number of project owner representative.
 - I. Existing work commitments.
 - J. List of work to be subcontracted. Name and addresses of subcontractors.
 - K. Names and addresses of major material Suppliers.
 - L. Statement that bidder is capable of completing the project within the stated time.
 - M. Safety record of company for the last 5 years showing any violations, etc.
 - N. List of all claims/resolutions/final judgements for the last 10 years.
 - O. Failure or refusal to furnish information requested shall constitute a basis for disqualification of Bidder and the withholding of the Bid Bond.
- 3.03 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

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

- 4.05 On request, Owner will 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 fill all holes and clean up and restore the Site to its former condition upon completion of 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 8 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 Paragraph 7.13.G of the General Conditions indicates that if an Owner safety program exists, it will be noted in the Supplementary Conditions.
- 4.08 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, including any Addenda;
 - 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 Paragraph 5.03 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 the Paragraph 5.06 of the Supplementary Conditions as containing reliable Technical Data;
 - E. Consider the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying any specific sequences 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. 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
 - I. Determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.

- J. The site shall be inspected only in the company of an authorized representative of the Owner with appointments made through the Owner's project representative. The representative's contact information for this project is Dan Williams, Dan.Williams@raleighnc.gov.

- 4.09 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 sequences 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 mandatory Pre-Bid Conference will be held at 11:00 AM local time on October 6, 2026 at the NRRRF Administration Building. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are required to attend and participate in the conference. Engineer will transmit to all prospective Bidders of record such Addenda as Engineer considers 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.

ARTICLE 7 – INTERPRETATIONS AND ADDENDA

- 7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing only. Interpretations or clarifications considered necessary by Engineer, in response to such questions, will be issued by Addenda to all plan holders registered with the Issuing Office. Questions received less than 5 working days prior to the date for opening of Bids may not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect. Engineer's email address is ChavezA@bv.com.
- 7.02 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by Owner or Engineer.
- 7.03 Submittal with questions shall include the project name, City Bid Number, the person's name submitting the question, firm, telephone number, and email address.
- 7.04 Addenda, when issued, will be on file at the offices of the Owner and Engineer and the NC Interactive Purchasing System (IPS) at least 24 hours before Bids are opened. It shall be the Bidder's responsibility to make inquiry as to the Addenda issued. All such Addenda shall become part of the Contract Documents and all Bidders shall be bound by such Addenda, whether or not received by the Bidders.

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 (determined by adding the base bid and all alternatives) and in the form of a certified check, bank money order, or a Bid Bond (on the form attached) issued by a surety meeting the requirements of Paragraphs 6.01 of the General Conditions.
- 8.02 The Bid security of the Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited. Such forfeiture shall be Owner's exclusive remedy if Bidder defaults. 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 the end of the Bid holding period, whereupon Bid security furnished by such Bidders will be returned.
- 8.03 Bid security of other Bidders whom Owner believes do not have a reasonable chance of receiving the award will be returned within 7 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, ready for final payment, and Milestones (if any) are set forth in Section 00520, Agreement.

ARTICLE 10 – LIQUIDATED DAMAGES

- 10.01 Provisions for liquidated damages, if any, are set forth in Section 00520, Agreement.

ARTICLE 11 – “OR-EQUAL” ITEMS

- 11.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, or those “or-equal” materials and equipment approved by Engineer and identified by Addendum. The materials and equipment described in the Bidding Documents establish a standard of required type, function and quality to be met by any proposed “or-equal” item. No item of material or equipment will be considered by Engineer as an “or-equal” unless written request for approval has been submitted by Bidder and has been received by Engineer within 15 days of the issuance of the Advertisement for Bids or invitation to Bidders. Each such request shall conform to the requirements of Paragraph 7.05 and 7.06 of the General Conditions and related Supplementary Conditions. The burden of proof of the merit of the proposed item is upon Bidder. Engineer's decision of approval or disapproval of a proposed item will be final. If Engineer approves any proposed item, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon approvals made in any other manner.

Applications for review of “or-equals” materials or equipment shall be by Bidders only.

- 11.02 All prices that Bidder sets forth in its Bid will be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as

supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of “or-equal” requests are made at Bidder’s sole risk.

ARTICLE 12 – SUBCONTRACTORS, SUPPLIERS AND OTHERS

- 12.01 If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, individuals, or entities to be submitted to Owner in advance of a specified date prior to the Effective Date of the Agreement, the apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening submit to Owner a list of all such Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, individual, or entity if requested by Owner. 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.
- 12.02 If apparent Successful Bidder declines to make any such substitution, Owner may declare the Bid as non-responsive and award the Contract to the next lowest 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 7.07 of the General Conditions.
- 12.03 Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom Contractor has reasonable objection.
- 12.04 The Contractor shall not award work to Subcontractor(s) in excess of the limits stated in Supplementary Conditions 7.07.

ARTICLE 13 – PREPARATION OF BID

- 13.01 The Bid Form is included with the Bidding Documents. Additional copies may be obtained from the Issuing Office. To bid the project the Bidder should be registered with the Issuing Office.
- 13.02 All blanks on the Bid Form shall be completed in ink and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each item listed therein. In the case of optional alternatives the words “No Bid,” “No Change,” or “Not Applicable” may be entered. Bid forms shall not be conditional, limited, or restricted in any way.
- 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 number 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. Bidder's state contractor license number, if any, shall also be shown on the Bid Form.

ARTICLE 14 – BASIS OF BID; COMPARISON OF BIDS

14.01 *Lump Sum*

- A. When the Bid Form is set up for Lump Sum bidding, Bidders shall submit a Bid on a lump sum basis as set forth in the Bid Form.
- B. When the Bid Form includes Alternate(s), Bidders shall submit a Bid on a lump sum basis for the base Bid and include a separate price for each alternate described in the Bidding Documents as provided for in the Bid Form. The price for each alternate will be the amount added to or deleted from the base Bid if Owner selects the alternate.
- C. In the comparison of Bids, alternatives will be applied in the same order of priority as listed in the Bid Form to the extent that project funds are available.

14.02 *Unit Price*

- A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the Bid schedule.
- B. The total of all estimated prices will be the sum of the products of the estimated quantity of each item and the corresponding unit price. The final quantities and Contract Price will be determined in accordance with Paragraph 13.03 of the General Conditions.
- C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.
- D. When the Bid Form includes Alternate(s), Bidder shall submit a Bid on a unit price basis for the base Bid and include a separate price for each alternate described in the Bidding Documents as provided for in the Bid Form. The price for each alternate will be the amount added to or deleted from the base Bid if Owner selects the alternate.

- E. In the comparison of Bids, alternatives will be applied in the same order of priority as listed in the Bid Form to the extent that project funds are available.

14.03 Allowances

- A. When the Bid Form includes cash allowances, the Bid price shall include such amounts as the Bidder deems proper for Contractor's overhead, costs, profit, and other expenses on account of cash allowances, if any, named in the Contract Documents, in accordance with Paragraph 13.02.B of the General Conditions.

ARTICLE 15 – SUBMITTAL OF BID

- 15.01 The Owner, at the location and time indicated in the Advertisement for Bids, will receive sealed Bids. Bids received after the indicated time and date shall not be considered.
- 15.02 With each copy of the Bidding Documents, a Bidder may be furnished one separate unbound copy of the Bid Form and the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid security and all attachments as outlined in Article 8 of the Bid Form. The complete list of required bid documents can also be found in the attached Bidder's Checklist. The completed checklist shall be the first page of all bids submitted.
- 15.03 A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the Advertisement For Bids and shall be enclosed in a plainly marked package with the Project title, City Bid Number, and project name as applicable, the name and address of Bidder, and shall be accompanied by the Bid security *Click or tap here to enter text.* and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED." A mailed Bid shall be addressed to Dan Williams, City of Raleigh, Raleigh Water, 8500 Battle Bridge Road, Raleigh, NC 27610.
- 15.04 The Bidder shall be fully responsible for timely delivery at the location designated for receipt of the Bids.

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. Modifications shall indicate only the amount to be added to or deducted from the Bidder's Bid amount as submitted on the Bid Form.
- 16.02 No bid may be withdrawn after the Bid opening for a period of time as indicated in the Bid Form except in accordance with the provisions of N.C. General Statutes 143-129.1.

ARTICLE 17 – OPENING OF BIDS

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

ARTICLE 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. 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 when the lowest responsible Bid is in excess of the funds available.
- 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 must be submitted as provided in the Supplementary Conditions.
- 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.
- 19.06 If the Contract is to be awarded, Owner will award the Contract to the Bidder whose Bid is in the best interests of the Project.
- 19.07 In determining the lowest responsible Bidder, Owner may take into consideration the past performance of Bidder on construction contracts with particular concern given to completion times, quality of work, safety record, cooperation with other contractors, and cooperation with owner.
- 19.08 In determining the responsive Bidder, Owner shall take into consideration bidder's compliance with the requirements of G.S. 143-128.2(c). Failure of the low bidder to furnish affidavit(s) and documentation as required by the Bid Form for compliance with G.S. 143-128.2(c) may constitute a basis for disqualification of the Bid.

- 19.09 Owner reserves the right to reject Bid as non-responsible if the evidence submitted by, or investigation of, such Bidder fails to satisfy Owner that such Bidder is properly qualified to carry out the obligations of the Agreement and to complete the Work described therein.
- 19.10 Should the Owner adjudge that the apparent low Bidder is not the lowest responsible Bidder by virtue of the above information, said apparent low Bidder will be so notified and his Bid security shall be returned.
- 19.11 If the Contract is to be awarded, the Owner reserves the right to award contracts to the lowest responsive, responsible bidder in the manner described above.

ARTICLE 20 – CONTRACT SECURITY AND INSURANCE

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

ARTICLE 21 – SIGNING OF AGREEMENT

- 21.01 When Owner issues a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unsigned counterparts of the Agreement along with the other Contract Documents which are identified in the Agreement as attached thereto. Within 15 consecutive calendar days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner. Within 90 consecutive calendar days thereafter, Owner shall deliver one fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.
- 21.02 In case of failure of Owner to execute the Agreement in the appropriate time, Bidder shall have the right to withdraw bid.
- 21.03 In case of failure of Bidder to execute the Agreement, Owner may at his option consider the Bidder in default, in which case Bid security accompanying Bid shall be retained by the Owner.
- 21.04 Applicable laws, ordinances, and the rules and regulations of authorities having jurisdiction over construction of the Project shall apply to the contract throughout.

ARTICLE 22 – SALES AND USE TAX

- 22.01 The Owner is exempt from sales and use taxes on materials and equipment to be incorporated in the Work. Said taxes shall not be included in the Bid. Refer to Paragraph 7.10 of the Supplementary Conditions for additional information.

END OF DOCUMENT

This page intentionally left blank.

BIDDER'S CHECKLIST

This checklist shall be included as the first page of the submitted bidding documents. As outlined in Article 7 of the Bid Form section, the following items shall be included with the fully executed Section 00410 Bid Form:

	A.	Required Bid security in the form of a Bid Bond (EJCDC No. C-430) or Certified Check (circle type of security provided); Bid Bond shall include an executed Power of Attorney.
	B.	Contractor's Certificates, Affidavit of Organization and Authority of Sworn Statement
	C.	City of Raleigh – Contractor's Poor Performance Policy
	D.	Non-Collusive Affidavit
	E.	Notice to Contractor Regarding Intrusions Beyond Project Limits
	F.	Evidence of authority to do business in the state of the Project (i.e., copy of contractor's license)
	G.	Proposed Subcontractors Form

This page intentionally left blank.

BID FORM

PROJECT: Neuse River Resource Recovery Facility BNR Basins MCC Replacement

CITY BID NO.: 274-BMC

BID FROM: _____

TABLE OF CONTENTS

	Page
Article 1 – Bid Recipient	1
Article 2 – Bidder’s Acknowledgements	1
Article 3 – Bidder’s Representations	2
Article 4 – Bidder’s Certification	3
Article 5 – Basis of Bid	3
Article 6 – Time of Completion	4
Article 7 – Attachments to This Bid	4
Article 8 – Defined Terms	5
Article 9 – Bid Submittal	5

ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

Dan Williams
Raleigh Water - Administration
8500 Battle Bridge Road
Raleigh, North Carolina 27610

Note: Bid Opening will be held at the Neuse River Resource Recovery Facility as described in the Advertisement.

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

ARTICLE 2 – BIDDER’S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to

acceptance for 120 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 – BIDDER’S REPRESENTATIONS

3.01 In submitting this bid, bidder represents that:

- A. Bidder has examined and carefully studied the Bidding Documents, other related data identified in the Bidding Documents, and the following Addenda, receipt of which is hereby acknowledged:

No. _____, dated _____

No. _____, dated _____

No. _____, dated _____

No. _____, dated _____

No. _____, dated _____

- 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 Supplemental Conditions - 5.02 as containing reliable Technical Data, and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in SC-5.06 as containing reliable Technical Data.
- E. Bidder has considered the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific sequences 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 3.01.E above, Bidder does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this 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.
- 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 this Bid is submitted.

ARTICLE 4 – BIDDER’S CERTIFICATION

4.01 Bidder certifies that:

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

ARTICLE 5 – BASIS OF BID

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

- A. An Allowance is included for the scope of services provided by CITI, Inc. in accordance with their proposal “CITI SCOPE PROPOSAL 000053” dated July 23, 2026, hereby made an attachment to the Contract Documents. The amount of the Allowance shall be: \$ 199,294).
- B. For all Work, including Allowances, a Lump Sum of:

_____ Dollars

(\$ _____)
- C. Bidder acknowledges that the rights of the Owner and the recommendations of the Engineer are not to be questioned in the Award of Contracts.
- D. Bidder acknowledges that it is the intention of the Mayor and City Council to let contracts on a basis of the Bids received in accordance with GS 143-129 and in such manner as they deem to be for the best interests of the Owner.
- E. Bidder acknowledges that the Owner reserves the right to accept or reject any or all bids and to waive any informalities in the bidding.
- F. Bidder acknowledges that should the total bid exceed the funds available to construct the project, the Owner reserves the right to reduce the scope of work from the project by deleting

certain lump sum or unit price bid items prior to awarding the contract to bring the project within the funds available.

- G. Bidder acknowledges that if this contract is awarded, Bidder must, with every pay request, furnish to the Public Utilities Director of the City of Raleigh an accurate itemized statement of North Carolina Sales Taxes paid on materials, supplies, equipment, and other items charged to this contract, and otherwise fully comply with the "Procedure for Reporting North Carolina Sales Tax Expenditures.". A sales tax form must be submitted even if there is no sales tax incurred.
- H. Bidder agrees to begin work within 10 days from the date of the Notice to Proceed.
- I. Bidder agrees that should the Owner reduce the scope of work by 25% or less of the Total Bid price prior to award of the contract, the lump sum and the unit price on all bid items shall remain unchanged.
- J. Bidder agrees that in the case of failure on his part to execute the said Contract and the Bonds within 15 consecutive calendar days after written notice being given of the award of the Contract, the check, cash or Bid Bond accompanying this Bid shall be paid into the funds of the Owner's Account set aside for this Project, as liquidated damages for such failure; otherwise the check, cash or Bid Bond accompanying this Bid shall be returned to the Bidder.
- K. Bidder agrees to provide all necessary tools, machinery, equipment, apparatus, and all other means necessary to do all the work and will furnish all labor, materials and all else required to complete such Contract as may be entered into, in the manner prescribed in and in accordance with the terms of the Specifications and Contract and in accordance with the true intent and meaning thereof, and in accordance with the Plans and/or Drawings and the requirements of the Engineers under them, in a first class manner.

ARTICLE 6 – TIME OF COMPLETION

- 6.01 Bidder agrees that the Work will be substantially complete within 633 calendar days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and will be completed and ready for final payment in accordance with Paragraph 15.06.B of the General Conditions within 661 calendar days after the date when the Contract Times commence to run.
- 6.02 Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within the Contract Times. This amount is agreed upon as the proper measure of liquidated damages the Owner will sustain, per day, by the failure of the undersigned to complete the work, within the stipulated time, and it is not to be construed, in any sense, as a penalty.

ARTICLE 7 – ATTACHMENTS TO THIS BID

- 7.01 The following documents are submitted with and made a condition of this Bid:
 - A. Required Bid security in the form of a Bid Bond or Certified Check (Section 00430);
 - B. Contractor's Certificates, Affidavit of Organization and Authority of Sworn Statement (Section 00441);
 - C. City of Raleigh – Contractor's Poor Performance Policy (Section 00442);
 - D. Non-Collusive Affidavit (Section 00443);
 - E. Notice to Contractor Regarding Intrusions Beyond Project Limits (Section 00444);
 - F. Evidence of authority to do business in the state of the Project (i.e., copy of contractor's license);

G. Proposed Subcontractors Form (Section 00433)

- 7.02 Submit the Bidder's Checklist as provided in the bidding documents with the bid submittal. The Checklist shall be completed and included as the first page of the submittal.
- 7.03 After the bid opening the Owner will consider all bids and alternates and determine the lowest responsible, responsive bidder.
- 7.04 Bidder understands that if this Bid is accepted by the Owner, Bidder shall not substitute for the subcontractors named in the Bid Documents except as allowed in the Supplementary Conditions.

ARTICLE 8 – DEFINED TERMS

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

ARTICLE 9 – BID SUBMITTAL

9.01 Bidder's License

- A. Number: _____
- B. Classification: _____
- C. Limitation: _____
- D. Employer's Tax ID No.: _____
- E. Business Address: _____
- F. Phone No.: _____ Fax No.: _____
- G. Contact Person: _____ E-mail Address: _____
- H. Phone No. w/ Ext.: _____

9.02 This Bid is submitted by:

If Bidder is:

An Individual

Name (typed or printed): _____

By: _____

(Individual's signature)

Doing business as: _____

A Partnership

Partnership Name: _____

The Organization and Internal Affairs of the Partnership are governed by the laws of the State of: _____

By: _____

(Signature of general partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Title (typed or printed): _____

Attest: _____

(Signature of Corporate Secretary)

A Corporation

Corporation Name: _____ (SEAL)

State of Incorporation: _____

Type (General Business, Professional, Service, Limited Liability): _____

By: _____

(Signature -- attach evidence of authority to sign)

Name (typed or printed): _____

Title (typed or printed): _____

(CORPORATE SEAL)

Attest: _____

(Signature of Corporate Secretary)

Date of Qualification to do business in North Carolina is ____/____/____.

Limited Liability Company - LLC

Name of LLC: _____

Name of State under whose Laws the Limited Liability Company was formed:

By: _____

(Signature of Manager)

Name (typed or printed): _____

Title (typed or printed): _____

This page intentionally left blank.

BID BOND (PENAL SUM FORM)

Bidder Name: Address <i>(principal place of business)</i> :	Surety Name: Address <i>(principal place of business)</i> :
Owner Name: City of Raleigh Address <i>(principal place of business)</i> : 222 W. Hargett Street Raleigh, NC 27601	Bid Project <i>(name and location)</i> : Neuse River Resource Recovery Facility BNR Basins MCC Replacement 8500 Battle Bridge Road, Raleigh, NC 27610 Bid Due Date:
Bond Penal Sum: Date of Bond:	
Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth in this Bid Bond, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.	
Bidder	Surety
_____ <i>(Full formal name of Bidder)</i>	_____ <i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature) (Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<i>Notes: (1) Note: Addresses are to be used for giving any required notice. (2) Provide execution by any additional parties, such as joint venturers, if necessary.</i>	

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

Section 00433

PROPOSED SUBCONTRACTORS FORM

In compliance with the Instructions to Bid and other Contract Documents, the undersigned submits the following names of Subcontractors to be used in performing the Work.

Bidder certifies that all Subcontractors listed are eligible to perform the Work.

Subcontractor's Work

Subcontractor's Name

NOTE: This form must be submitted with the Bid in accordance with the Instructions to Bid.

Bidder's Signature

This page intentionally left blank.

CONTRACTOR'S CERTIFICATES
AFFIDAVIT OF ORGANIZATION AND AUTHORITY
AND
SWORN STATEMENT

STATE OF _____)

COUNTY _____)
OF _____

_____ being the first duly sworn on oath deposes and says that the Bidder on the attached Bid is organized as indicated below and that all statements herein made are made on behalf of such Bidder and that this deponent is authorized to make them.

(Fill Out Applicable Paragraph)

1. CORPORATION:

The Bidder is a Corporation organized and existing under the laws of the State of _____ and its President is _____ ; its Secretary is _____ , and it does have a corporate seal. The President is authorized to sign construction contracts and bids for the Company by action of its Board of Directors taken _____ a certified copy of which is hereto attached. (Strike out last sentence if not applicable.)

2. PARTNERSHIP:

The Bidder is a partnership consisting of _____ and _____ , partners doing business under the name of: _____

3. SOLE TRADER:

The Bidder is an individual and if operating under a trade name, such trade name is as follows: _____

4. ADDRESS:

The business address of the Bidder is as follows: _____

Its phone number is _____

_____ Bidder

By: _____

Subscribed and sworn to before me this _____ day of _____, 20 ____ .
Co.

Notary Public

My Commission Expires:

CITY OF RALEIGH
CONTRACTOR'S POOR PERFORMANCE POLICY

RESOLUTION NO. (1992) 790

A RESOLUTION TO REGULATE THE PARTICIPATION IN CITY CONSTRUCTION PROJECTS BY CONTRACTORS WHO MAY NOT BE CAPABLE OF TIMELY AND PROPER COMPLETION OF CITY PROJECTS.

WHEREAS, the City of Raleigh wishes to minimize cost and inconvenience to the citizenry caused by the failure of contractors to complete projects in a timely manner in accordance with approved project schedules; and

WHEREAS, North Carolina law allows cities to award bids to responsible bidders and the inability to complete work on time is one indication of a lack of responsibility.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF RALEIGH:

Section 1. That the City Manager may disqualify bidders from participation in bidding and award of contracts for city construction projects based on the following conditions existing simultaneously:

- A. The dollar value of the work completed is less than the dollar value of the work which should have been completed on the basis of the contractor's approved progress schedule by more than twenty percent of the current contract amount. The dollar amount of the work completed will be the total estimate to date shown in the latest partial pay estimate. The current contract amount will be the contract estimate plus accumulated overruns and less accumulated underruns shown in the latest partial pay estimate.
- B. The percentage of the work completed is less than the percentage of contract time elapsed on the work by more than twenty percent. The percentage of work completed will be the dollar value of the work completed as defined above divided by the current contract amount as defined above. The percentage of contract time elapsed will be the number of calendar days elapsed as shown in the latest partial pay estimate divided by the total contract time in calendar days.

Section 2. The City Manager shall not include any late days which are caused by the City in any of his calculations directed at determining bid status.

Section 3. All City construction project specifications shall contain a specific provision clearly outlining the policies set out in this Resolution, including the criteria for determining whether a contractor is behind schedule, and the specifications shall clearly state the City's intent to enforce the provisions of this Resolution.

Section 4. The terms of this Resolution shall apply only to contracts for which the specifications for bidders are issued after the effective date of this Resolution.

Section 5. Any contractor who wishes to contest the decision of the City Manager declaring ineligibility may appeal to the City Council by delivering a notice of appeal to the City Clerk no later than ten days after receipt of the City Manager's decision. The notice of appeal shall clearly set out the reasons why the Contractor believes that the terms of this Resolution have been inappropriately applied or the equitable arguments for not applying this Resolution's terms. When considering an appeal the City Council shall consider, among other things, the report of the City manager, the notice of appeal, and the contractor's current status on any other current City contracts and its performance on any other contracts to which the contractor and the City have been parties to within the two calendar years immediately preceding the filing of the notice of appeal.

Section 6. Bidders so disqualified shall remain disqualified for any period in which they are still in conflict with the schedule provisions of this section.

Section 7. This Resolution is effective upon adoption.

ADOPTED: 10/6/92

EFFECTIVE: 10/6/92

I have read and understand the City of Raleigh's policy as stated above.

Signature

Printed Name

Title

Date

NON-COLLUSIVE AFFIDAVIT

State of _____)

County of _____)

First being duly sworn deposes and says that:

- (1) He is the _____
(Owner, Partner, Officer, Representative or Agent)
of _____ the Bidder that has submitted the attached Bid;
- (2) He is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;
- (3) Such Bid is genuine and is not a collusive or sham Bid;
- (4) Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, have in any way colluded, conspired, connived or agreed, directly or indirectly, with any other Bidder, firm, or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted; or to refrain from bidding in connection with such Contract; or have in any manner, directly or indirectly, sought by agreement or collusion, or communication, or conference with any Bidder, firm, or person to fix the price or prices in the attached Bid or of any other Bidder, or to fix any overhead, profit, or cost elements of the Bid price or the Bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance, or unlawful agreement any advantage against (Recipient), or any person interested in the proposed Contract;
- (5) The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance, or unlawful agreement on the part of the Bidder or any other of its agents, representatives, owners, employees or parties in interest, including this affidavit.

BY _____

PRINTED OR TYPED NAME _____

ITS _____
(Title)

Subscribed and sworn to before me this _____ day of _____, 20____.

Notary Public My commission expires _____

END OF AFFIDAVIT

This page intentionally left blank.

NOTICE TO CONTRACTOR REGARDING INTRUSIONS BEYOND PROJECT LIMITS

The Contractor and Owner hereby acknowledge that the Owner has acquired permanent and temporary easements on private property for the construction of the Project (the "Easements"), and that the Easements, together with public street rights-of-way (and previously acquired easements) comprise the sole areas where the Contractor is allowed to work on the Project, or to use for mobilization, access, staging, storage, and other purposes associated with the Project.

ANY OCCUPANCY OF OR INTRUSIONS ONTO PRIVATE PROPERTY OUTSIDE THE EASEMENTS OR RIGHTS-OF-WAY OWNED OR CONTROLLED BY THE CITY WILL CONSTITUTE A TRESPASS UPON PRIVATE PROPERTY AND MAY RESULT IN SERIOUS LEGAL CONSEQUENCES FOR THE CITY OF RALEIGH.

The Contractor shall be solely responsible for any intrusions onto private property outside the Easements or rights-of-way owned or controlled by the City. The Contractor hereby agrees to save, defend, hold harmless, and indemnify the City from all actions, claims, and liabilities, arising from such actions including, but not limited to, the payment of attorney's fees.

The only exception to the above stated limitations on the Contractor's work area will be in those instances where the Contractor has independently negotiated and secured agreements for temporary work and/or access privileges from Property Owners. These independently negotiated agreements must be in writing, and a copy of any such agreement shall be provided to the City in advance of any use or occupancy of private property pursuant to the agreement. The terms of any independently negotiated agreement shall clearly express to the Property Owner that the Contractor is seeking such use, occupancy, or access independently from the City of Raleigh and its Contract with the City of Raleigh, and that the Contractor shall be solely responsible for activities carried out on such areas.

I have read and understand the City of Raleigh's policy as stated above.

Signature

Printed Name

Title

Date

This page intentionally left blank.

NOTICE OF AWARD

Date of Issuance:

Owner:

Owner's Project

Engineer:

Engineer's Project

Project:

Contract Name:

Bidder:

Bidder's Address:

You are notified that Owner has accepted your Bid dated **[date]** for the above Contract, and that you are the Successful Bidder and are awarded a Contract for: Neuse River Resource Recovery Facility BNR Basins MCC Replacement Project

The Contract Price of the awarded Contract is **\$(Contract Price)**. Contract Price is subject to adjustment based on the provisions of the Contract, including but not limited to those governing changes, Unit Price Work, and Work performed on a cost-plus-fee basis, as applicable.

Five unexecuted counterparts of the Agreement accompany this Notice of Award, and one copy of the Contract Documents accompanies this Notice of Award or has been transmitted or made available to Bidder electronically.

☒ Drawings will be delivered separately from the other Contract Documents.

You must comply with the following conditions precedent within 15 days of the date of receipt of this Notice of Award:

1. Electronically execute Agreement when provided by the City of Raleigh (as Contractor).
2. Deliver with the signed Agreement(s) the Contract security (such as required performance and payment bonds) and insurance documentation, as specified in the Instructions to Bidders and in the General Conditions, Articles 2 and 6.
3. Other conditions precedent (if any): **NA**

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

Within **90**days after you comply with the above conditions, Owner will return to you one fully signed counterpart of the Agreement, together with any additional copies of the Contract Documents as indicated in Paragraph 2.02 of the General Conditions.

Owner: **City of Raleigh**

By (signature): _____

Name (printed): _____

Title: _____

Copy: Engineer

This page intentionally left blank.

AGREEMENT

INSTRUCTIONS TO CONTRACTORS AND REQUIREMENTS AS TO FORM FOR CITY OF RALEIGH, NC AGREEMENTS

DO NOT REMOVE FROM AGREEMENT

Please observe the following in executing the attached Contract:

1. The Owner may enter into an Agreement with three types of legal entities.
 - (a) If the Agreement is with an individual, that individual should sign the Agreement exactly as his name is set out. If the Agreement is with an individually-owned business, the Agreement should be with the individual owner, and not the named business.
 - (b) Execution on behalf of a corporation should be by an authorized corporate officer, with a second corporate officer signing to attest, with the corporate seal affixed. An official other than a corporate officer should attach documentation of their authority to execute and bind the company.
 - (c) If the Agreement is with a partnership, a general partner may execute unless an authorized partner is designated to execute. Documentation of such authorization should be attached.
2. After signing the Agreement, the appropriate notary's acknowledgement, either in the corporate form or individual/partnership form should be completed.
3. The Performance and Payment Bonds should be attached to the Agreement package. They should be signed by the Agree mentor, and his signature should be acknowledged with the appropriate acknowledge form. Next, the Bonds, in approved form, must be signed by the authorized agent of the Surety Company issuing the Bonds, and an executed Power of Attorney document authorizing the agent to sign must accompany the Bond Documents.
4. The Agreement should not be dated, except by the last person executing the Agreement, normally the City Clerk.
5. The Bid Form and all other documents submitted with the Bid shall be included with the Agreement and as noted in Article 9.
6. Page 00510 -1: Complete the Acceptance of Notice section on this page.
7. Pages 00520-3 through 00520-13: Complete in entirety.
8. Section 00610, 00615, 00617, and 00618: Complete in entirety.

9. Section 00618: Certificate of Insurance, Article 5 of the General and Supplementary Conditions requires the Certificate of Insurance to have those named as Additional Insured in each policy issued.
10. Most Certificates of Insurance state under the cancellation clause that "the issuing company will endeavor to mail 30 days written notice to the ..." and "but failure to mail such notice shall impose no obligation or liability of any kind upon the Company, its agents or representatives. Direct Notice of Cancellation endorsement is to be attached to corresponding Certificates of Insurance. With regard to expiration, cancellation, reduction, restriction, or any other change, certificates shall state:

"Should any of the following described policies be canceled before expiration date or be due to expire within thirty (30) days, the insurer shall mail thirty (30) days prior written notice to named certificate holder."
11. Four copies of the Contract are sent to the Contractor. The original and duplicates should be signed and returned to the Owner for signature, after which two duplicates will be returned to the Contractor. One copy may be retained by the Contractor and the other is for the use of the Bonding Company(s).
12. Failure to fully complete all four sets of the Contract Documents will cause delays in the approval by the Owner and therefore delay the issuance of the Notice to Proceed.

**AGREEMENT
BETWEEN OWNER AND CONTRACTOR
FOR CONSTRUCTION CONTRACT
CITY CONTRACT NO.
CITY PURCHASE ORDER NO.**

THIS AGREEMENT is by and between The City of Raleigh (Owner) and [Contractor's Name] (Contractor).

Owner and Contractor hereby agree as follows:

ARTICLE 1 – WORK

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

- Demolition and in-kind replacement of MCC-P4B, MCC-P5B, and MCC-P6B.
- Demolition and replacement of PLC-81, PLC-82, and PLC-83 cabinets.
- New prefabricated metal enclosure with walls, roof, doors, lighting, and HVAC system to house new MCC and PLC.
- Extension of existing concrete foundation to accommodate new enclosure footprint.
- Demolition and replacement of all power wire cable within existing conduit from each MCC to each motor and device on BNR Aeration Basins 1-6.
- Demolition and replacement of sections of corroded electrical conduit from each MCC to each motor and device on BNR Aeration Basins 1-6.

ARTICLE 2 – THE PROJECT

The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows: Neuse River Resource Recovery Facility BNR Basins MCC Replacement

ARTICLE 3 – ENGINEER

The Project has been designed by Black and Veatch International Company, 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. The Owner may assign a Job Site Observer.

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 *Days to Achieve Substantial Completion and Final Payment*

- A. The Work will be substantially completed within 633 days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and completed and ready for final payment in accordance with Paragraph

15.06 of the General Conditions within 661 after the date when the Contract Times commence to run.

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 11 of the General Conditions. 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):
1. *Substantial Completion:* Contractor shall pay Owner \$1,000 for each day that expires after the time specified in Paragraph 4.02 above for Substantial Completion until the Work is substantially complete.
 2. *Completion of Remaining Work:* After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times or any proper extension thereof granted by Owner, Contractor shall pay Owner \$1,000 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.
 3. Liquidated damages for failing to timely attain Milestones, Substantial Completion, and final completion are not additive, and will not be imposed concurrently.
- B. If Owner recovers liquidated damages for a delay in completion by Contractor, then such liquidated damages are Owner's sole and exclusive remedy for such delay, and Owner is precluded from recovering any other damages, whether actual, direct, excess, or consequential, for such delay, except for special damages (if any) specified in this Agreement.

4.04 *Milestone Dates*

- A. The following principal events shall be completed and ready for final payment in accordance with paragraph 15.06 of the General Conditions within days indicated below after the date when the Contract Time commences to run. In accordance with paragraph 4.03 above as liquidated damages for delay (but not as penalty) Contractor shall pay Owner the amounts indicated below for each day that expires after the time specified below for completion and readiness for final payment.

Milestone Event	Max Duration in Consecutive Calendar Days	Liquidated Damages
1. MCC-PXB Demolition and Replacement	74	\$1,000
2. PLC-8X Demolition and Replacement	46	\$1,000

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 equal to the sum of the amounts determined pursuant to Paragraph 5.01.A *below*:

The Contract Price shall not exceed the Total Contract amount of XXXXXXXX Dollars (\$XXXXXX.00) unless changed by a duly authorized amendment or change order.

A. For all Work other than Unit Price Work, a lump sum of _____ Dollars

(\$ _____)

All specific cash allowances are included in the above price in accordance with Paragraph 13.02 of the General Conditions.

ARTICLE 6 – PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

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

6.02 *Progress Payments; Retainage*

- A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the 25th 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 2.05 of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements.
1. Prior to Final Completion, progress payments will be made in an amount equal to the percentage indicated in the Supplemental Conditions 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 15.01 of the General Conditions.

6.03 *Final Payment*

- A. Upon final completion and acceptance of the Work in accordance with Paragraph 15.06 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 15.06.

ARTICLE 7 – INTEREST

- 7.01 Once a Progress or Final Payment Application has been submitted by the contractor, recommended by the Engineer, and Approved by the Owner, if payment is not made, the Contractor will be due interest beginning on the 46th day following Owner acceptance at a

rate of 1% per month or fraction thereof in accordance with NC General Statute 143-134.1(a).

ARTICLE 8 – CONTRACTOR’S REPRESENTATIONS

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-5.03 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-5.06 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.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 Contents

A. The Contract Documents consist of the following:

1. This Agreement (pages 00520-1 to 00520-11, inclusive).
2. Performance bond (pages 00610-1 to 00610-4, inclusive).
3. Payment bond (pages 00615-1 to 00615-4, inclusive).
4. Affidavit (page 00617).
5. Certificate of Insurance (page 00618).
6. General Conditions (pages 00700-1 to 00700-70, inclusive).
7. Supplementary Conditions (pages 00800-1 to 00800-37, inclusive).
8. Specifications as listed in the table of contents of the Project Manual.
9. Drawings consisting of XX sheets with each sheet bearing the following general title:
NRRRF BNR Basins MCC Replacement.
10. Addenda as follows: N/A
11. Exhibits to this Agreement (enumerated as follows):
 - a. Contractor's Bid (Sections 00410 and 00430).
 - b. Documentation submitted by Contractor prior to Notice of Award (City of Raleigh Bid Documentation; Sections 00440, 00441, 00442, 00443, and 00444).
 - c. Notice of Award (Section 00510).
12. 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 (Section 00550).
 - b. Work Change Directives (Section 00940).
 - c. Change Orders (Section 00941).
 - d. Field Orders (Section 00942).
 - e. Warranty Bonds, if any.

B. The documents listed in Paragraph 9.01.A are attached to this Agreement (**except as expressly noted otherwise above**).

C. There are no Contract Documents other than those listed above in this Article 9.

- D. The Contract Documents may only be amended, modified, or supplemented as provided in the Contract.

ARTICLE 10 – MISCELLANEOUS

10.01 *Terms*

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

10.02 *Assignment of Contract*

- A. 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.

10.05 *Contractor's Certifications*

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

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

10.06 *Right to Audit Clause*

- A. Contractor's, subcontractors' and sub-subcontractors' "records" shall upon reasonable notice be open to inspection and subject to audit and/or reproduction during normal business working hours. Such audits may be performed by a City's representative or an outside representative engaged by City. The City or its designee may conduct such audits or inspections throughout the term of this Contract and for a period of three years after final payment or longer if required by law. City's representatives may (without limitation) conduct verifications such as counting employees at the Construction Site, witnessing the distribution of payroll, verifying information and amounts through interviews and written confirmations with Contractor employees, field and agency labor, subcontractors, and vendors.
- B. Such records shall include (hard copy, as well as computer readable data if it can be made available): written policies and procedures; time sheets; payroll registers; payroll records; cancelled payroll checks; subcontract files (including proposals of successful and unsuccessful bidders, bid recaps, negotiation notes, etc.); original bid estimates; estimating work sheets; correspondence; Change Order files (including documentation covering negotiated settlements); back charge logs and supporting documentation; invoices and related payment documentation; general ledger information detailing cash and trade discounts earned, insurance rebates and dividends; and any other Contractor records which may have a bearing on matters of interest to the City in its sole discretion in connection with the Contractor's dealings with the City, including but not limited to:
 - 1. Compliance with Contract requirements for deliverables;
 - 2. Compliance with Construction Documents;
 - 3. Compliance with City's business ethics expectations;
 - 4. Compliance with Contract provisions regarding the pricing of Change Orders;
 - 5. Accuracy of Contractor representations regarding the pricing of invoices; or
 - 6. Accuracy of Contractor representations related to claims submitted by the Contractor or any of its payees.
- C. Contractor shall require all payees (examples of payees include subcontractors, material suppliers, insurance carriers, etc.) to comply with the provisions of this article by including the requirements hereof in a written contract agreement between Contractor and payee. Contractor will ensure that all payees (including those entering into lump sum contracts) have the same right to audit provisions contained in this Contract.
- D. City's authorized representative or designee shall have reasonable access to the Contractor's facilities, shall be allowed to interview all current or former employees to discuss matters pertinent to the performance of this Contract and shall be provided adequate and appropriate work space, in order to conduct audits in compliance with this article.

- E. If an audit, inspection or examination in accordance with this article, discloses overpricing or overcharges (of any nature) by the Contractor to the City in excess of one percent (1%) of the total contract billings, in addition to making adjustments for the overcharges, the reasonable actual cost of the City's audit shall be reimbursed to the City by the Contractor. Any adjustments and/or payments which must be made as a result of any such audit or inspection of the Contractor's invoices and/or records shall be made within a reasonable amount of time (not to exceed 90 days) from presentation of City's findings to Contractor.
- F. The Contractor agrees to maintain all information pertaining to billing for services performed under this Contract in accordance with state law for public records. The Contractor shall afford the City access to these records for audit at such intervals as may be desired by the City. The Contractor shall also preserve the records for a period of three (3) years after Final Payment (or, alternatively, for a period of three years after termination of this Contract), or longer if required by law, during which time the City shall have access for audit purposes.
- G. The rights established under this section shall survive the expiration or termination of this Contract, and shall not be deleted, circumvented, limited, confined, or restricted by contract or any other section, clause, addendum, attachment or subsequent amendment to this Contract or any of the other Contract Documents.

10.07 *Iran Divestment Act Certification*

- A. Contractor certifies that, as of the date listed below, it is not on the Final Divestment List as created by the State Treasurer pursuant to N.C.G.S. § 147-86.55, et seq. In compliance with the requirements of the Iran Divestment Act and N.C.G.S. § 147-86.59, Contractor shall not utilize in the performance of the contract any subcontractor that is identified on the Final Divestment List.

10.08 *E – Verify*

- A. Contractor shall comply with E-Verify, the federal E-Verify program operated by the United States Department of Homeland Security and other federal agencies, or any successor or equivalent program used to verify the work authorization of newly hired employees pursuant to federal law and as in accordance with N.C.G.S. §64-25 et seq. In addition, to the best of Contractor's knowledge, any subcontractor employed by Contractor as a part of this contract shall be in compliance with the requirements of E-Verify and N.C.G.S. §64-25 et seq.

10.09 *Companies Boycotting Israel Divestment Act Certification*

- A. Contractor certifies that it has not been designated by the North Carolina State Treasurer as a company engaged in the boycott of Israel pursuant to N.C.G.S. 147-86.81.

10.10 *Applicability of North Carolina Public Records Law*

- 10.11 Notwithstanding any other provisions of this Contract, this Contract and all materials submitted to the City by the Contractor are subject to the public records laws of the State of North Carolina and it is the responsibility of the Contractor to properly designate materials that may be protected from disclosure as trade secrets under North Carolina law as such and in the form required by law prior to the submission of such materials to the City. Contractor understands and agrees that the City may take any and all actions necessary to comply with federal, state, and local laws and/or judicial orders and such actions will not constitute a breach of the terms of this Contract. To the extent that any other provisions of this Contract conflict with this paragraph, the provisions of this section shall control.

THIS SPACE LEFT BLANK INTENTIONALLY

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement by digital signature, under seal, on the respective dates below. 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 shall be effective upon the date of the City's signature ("Effective Date").

OWNER:

CONTRACTOR:

CITY OF RALEIGH

a North Carolina municipal corporation

By: _____

Name: _____

Title: Choose an item.

Date: _____

By: _____

Name: _____

Title: _____

Date: _____

Attest: _____

Title: **City Clerk (or designee)**

Attest: _____

Title: _____

Address for giving notices:

City of Raleigh

222 W. Hargett Street

Raleigh, North Carolina 27601

Address for giving notices:

License No.: _____

This instrument has been pre-audited in the manner required by the Local Government Budget and Fiscal Control Act.

Chief Financial Officer (or designee)

NOTICE TO PROCEED

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

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on **[date Contract Times are to start]** pursuant to Paragraph 4.01 of the General Conditions.

On that date, Contractor shall start performing its obligations under the Contract Documents. No Work will be done at the Site prior to such date.

In accordance with the Agreement:

The number of days to achieve Substantial Completion is **[number of days, from Agreement]** from the date stated above for the commencement of the Contract Times, resulting in a date for Substantial Completion of **[date, calculated from commencement date above]**; and the number of days to achieve readiness for final payment is **[number of days, from Agreement]** from the commencement date of the Contract Times, resulting in a date for readiness for final payment of **[date, calculated from commencement date above]**.

Before starting any Work at the Site, Contractor must comply with the following:

[Note any access limitations, security procedures, or other restrictions]

Owner: _____
By (signature): _____
Name (printed): _____
Title: _____
Date Issued: _____
Copy: Engineer

This page intentionally left blank.

PERFORMANCE BOND

Contractor Name: Address <i>(as registered with Secretary of State, if applicable)</i> :	Surety Name: Address <i>(as registered with Secretary of State, if applicable)</i> :
Owner Name: Mailing address:	Contract Description <i>(name and location)</i> : Contract Price: Effective Date of Contract:
Bond Bond Amount: Date of Bond: <i>(Date of Bond cannot be earlier than Effective Date of Contract)</i> Modifications to this Bond form: ☐ None ☐ See Paragraph 16	
Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Performance Bond, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.	
Contractor as Principal	Surety
<i>(Full formal name of Contractor)</i>	<i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature)(Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.</i>	

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 satisfactorily 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 will 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 may 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 will 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 does 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 does 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 will not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety will 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 will not be reduced or set off on account of any such unrelated obligations. No right of action will 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 must be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and must 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 will be applicable.
- 12. Notice to the Surety, the Owner, or the Contractor must 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 will be deemed deleted therefrom and provisions conforming to such

statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will 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 will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.
16. Modifications to this Bond are as follows: **None**

PAYMENT BOND

Contractor Name: Address <i>(as registered w/ Secretary of State, if applicable)</i> :	Surety Name: Address <i>(as registered w/ Secretary of State, if applicable)</i> :
Owner Name: Mailing address:	Contract Description <i>(name and location)</i> : Contract Price: Effective Date of Contract:
Bond Bond Amount: Date of Bond: <i>(Date of Bond cannot be earlier than Effective Date of Contract)</i> Modifications to this Bond form: ☐ None ☐ See Paragraph 18	
Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Payment Bond, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.	
Contractor as Principal	Surety
<i>(Full formal name of Contractor)</i>	<i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature)(Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.</i>	

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 will 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 will 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~~ shall be 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 will 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 will 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 will 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 will 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 satisfying 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 will 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 will be applicable.
13. Notice and Claims to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, will 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 will be deemed deleted here from and provisions conforming to such statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will 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:

16.1.1. The name of the Claimant;

16.1.2. The name of the person for whom the labor was done, or materials or equipment furnished;

- 16.1.3. 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;
 - 16.1.4. A brief description of the labor, materials, or equipment furnished;
 - 16.1.5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
 - 16.1.6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
 - 16.1.7. The total amount of previous payments received by the Claimant; and
 - 16.1.8. 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 is 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 will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.
18. Modifications to this Bond are as follows: **None**

AFFIDAVIT

(To be attached to all Contracts)

STATE OF _____)
) SS
COUNTY OF _____)

_____ being first duly sworn on oath deposes and says that (s)he is _____

(attorney-in-fact or agent) of _____

(bonding company) surety on the attached Contract on _____

_____ executed by _____ (Contractor).

Affiant further deposes and says that no officer, official, or employee of the Owner has any direct or indirect interest, or is receiving any premium, commission, fee, or other thing of value on account of the same or the furnishing of the Bond, undertaking, contract of indemnity, guaranty, or suretyship in connection with the above-mentioned contract.

Signed _____

Subscribed and sworn to before me this _____ day of _____, A.D., 20_____.

(Notary Public, _____ County, _____)

My Commission Expires _____.

This page intentionally left blank.

PAGE FOR ATTACHING
CERTIFICATE OF INSURANCE

This page intentionally left blank.

Contractor's Application for Payment

Owner: _____ Engineer: _____ Contractor: _____ PO #: _____ Project: _____ Contractor Address: _____ Contract: _____	Owner's Project No.: _____ Engineer's Project No.: _____ Contractor's Project No.: _____																																										
Application No.: _____ Application Date: _____																																											
Application Period: From _____ to _____																																											
<table border="1" style="width: 100%; border-collapse: collapse;"><tr><td style="width: 70%;">1. Original Contract Price</td><td style="width: 10%; text-align: center;">\$</td><td style="width: 20%; text-align: right;">-</td></tr><tr><td>2. Net change by Change Orders</td><td></td><td></td></tr><tr><td>3. Current Contract Price (Line 1 + Line 2)</td><td style="text-align: center;">\$</td><td style="text-align: right;">-</td></tr><tr><td>4. Total Work completed and materials stored to date (Sum of Column G Lump Sum Total and Column J Unit Price Total)</td><td style="text-align: center;">\$</td><td style="text-align: right;">-</td></tr><tr><td>5. Retainage</td><td></td><td></td></tr><tr><td> a. _____ X \$ - Work Completed</td><td style="text-align: center;">\$</td><td style="text-align: right;">-</td></tr><tr><td> b. _____ X \$ - Stored Materials</td><td style="text-align: center;">\$</td><td style="text-align: right;">-</td></tr><tr><td> c. Total Retainage (Line 5.a + Line 5.b)</td><td style="text-align: center;">\$</td><td style="text-align: right;">-</td></tr><tr><td>6. Amount eligible to date (Line 4 - Line 5.c)</td><td style="text-align: center;">\$</td><td style="text-align: right;">-</td></tr><tr><td>7. Less previous payments (Line 6 from prior application)</td><td></td><td></td></tr><tr><td>8. Contract Subtotal this application (Excludes Sales Tax)</td><td style="text-align: center;">\$</td><td style="text-align: right;">-</td></tr><tr><td>9. Sales Tax due this period</td><td></td><td></td></tr><tr><td>10. Amount due this application</td><td style="text-align: center;">\$</td><td style="text-align: right;">-</td></tr><tr><td>11. Balance to finish, including retainage (Line 3 - Line 6)</td><td style="text-align: center;">\$</td><td style="text-align: right;">-</td></tr></table>		1. Original Contract Price	\$	-	2. Net change by Change Orders			3. Current Contract Price (Line 1 + Line 2)	\$	-	4. Total Work completed and materials stored to date (Sum of Column G Lump Sum Total and Column J Unit Price Total)	\$	-	5. Retainage			a. _____ X \$ - Work Completed	\$	-	b. _____ X \$ - Stored Materials	\$	-	c. Total Retainage (Line 5.a + Line 5.b)	\$	-	6. Amount eligible to date (Line 4 - Line 5.c)	\$	-	7. Less previous payments (Line 6 from prior application)			8. Contract Subtotal this application (Excludes Sales Tax)	\$	-	9. Sales Tax due this period			10. Amount due this application	\$	-	11. Balance to finish, including retainage (Line 3 - Line 6)	\$	-
1. Original Contract Price	\$	-																																									
2. Net change by Change Orders																																											
3. Current Contract Price (Line 1 + Line 2)	\$	-																																									
4. Total Work completed and materials stored to date (Sum of Column G Lump Sum Total and Column J Unit Price Total)	\$	-																																									
5. Retainage																																											
a. _____ X \$ - Work Completed	\$	-																																									
b. _____ X \$ - Stored Materials	\$	-																																									
c. Total Retainage (Line 5.a + Line 5.b)	\$	-																																									
6. Amount eligible to date (Line 4 - Line 5.c)	\$	-																																									
7. Less previous payments (Line 6 from prior application)																																											
8. Contract Subtotal this application (Excludes Sales Tax)	\$	-																																									
9. Sales Tax due this period																																											
10. Amount due this application	\$	-																																									
11. Balance to finish, including retainage (Line 3 - Line 6)	\$	-																																									
Contractor's Certification The undersigned Contractor certifies, to the best of its knowledge, the following: (1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment; (2) Title to all Work, materials and equipment incorporated in said Work, or otherwise listed in or covered by this Application for Payment, will pass to Owner at time of payment free and clear of all liens, security interests, and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such liens, security interest, or encumbrances); and (3) All the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.																																											
Contractor: _____																																											
Signature: _____ Date: _____																																											
Recommended by Engineer By: _____ Title: _____ Date: _____	Approved by Owner By: _____ Title: _____ Date: _____																																										
Approved by Funding Agency By: _____ Title: _____ Date: _____	By: _____ Title: _____ Date: _____																																										

Contractor's Application for Payment

City of Raleigh 00620 Application for Payment
 Lump Sum EJCDC C-620 Contractor's Application for Payment 2 of 7
 (c) 2018 National Society of Professional Engineers for EJCDC. All rights reserved.

Contractor's Application for Payment

City of Raleigh 00620 Application for Payment
 Lump Sum EJCDC C-620 Contractor's Application for Payment 3 of 7
 (c) 2018 National Society of Professional Engineers for EJCDC. All rights reserved.

Contractor's Application for Payment

Owner:	_____	Owner's Project No.:	_____
Engineer:	_____	Engineer's Project No.:	_____
Contractor:	_____	Contractor's Project No.:	_____
Project:	_____		
Contract:	_____		

City of Raleigh
Unit Price

00620
EJCDC C-620 Contractor's Application for Payment
(c) 2018 National Society of Professional Engineers for EJCDC. All rights reserved.

Application for Payment
4 of 4

Contractor's Application for Payment

Owner:	_____	Owner's Project No.:	_____
Engineer:	_____	Engineer's Project No.:	_____
Contractor:	_____	Contractor's Project No.:	_____
Project:	_____		
Contract:	_____		

Application No.: _____	Application Period: From _____ to _____	Application Date: _____
------------------------	---	-------------------------

Contractor's Application for Payment

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

Application No.: _____ Application Period: From _____ to _____ Application Date: _____

[illegible]

This page intentionally left blank.

CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner:
Engineer:
Contractor:
Project:
Contract Name:

Owner's Project No.:
Engineer's Project No.:
Contractor's Project No.:

This ☐ Preliminary ☐ Final Certificate of Substantial Completion applies to:

☐ All Work ☐ The following specified portions of the Work:

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 Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor; see Paragraph 15.03.D of the General Conditions.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work must be as provided in the Contract, except as amended as follows:

Amendments to Owner's Responsibilities: ☐ None ☐ As follows:

Amendments to Contractor's Responsibilities: ☐ None ☐ As follows:

The following documents are attached to and made a 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.

Engineer

By (signature): _____
Name (printed): _____
Title: _____

This page intentionally left blank.

PAGE FOR ATTACHING

POWER OF ATTORNEY

*Note: If the recorded POA from the Register of Deeds
is attached, page 00634-2 is not necessary.*

STATE OF NORTH CAROLINA
COUNTY OF _____

This is to certify that on the _____ day of _____, 20__, before me personally appeared before me to the undersigned Notary Public, _____ who, being first duly sworn, acknowledged the due execution of the foregoing instrument for the purpose therein stated.

Witness my hand and notarial seal this the _____ day of _____, 20__.

(SEAL)

Notary Public

My Commission Expires:

STATE OF NORTH CAROLINA
COUNTY OF _____

This is to certify that on the _____ day of _____, 20__, before me personally came _____, with whom I am personally acquainted, who, being by me duly sworn, says that (s)he is the President and _____ is the Secretary of _____, Incorporated, the corporation described in and which executed the foregoing instrument; that (s)he knows the common seal of said corporation; that the seal affixed to the foregoing instrument is said common seal, and the name of the corporation was subscribed thereto by the said Secretary and the said corporate seal was affixed, all by order of the Board of Directors of said corporation, and that the said instrument is the act and deed of said corporation.

Witness my hand and notarial seal this the _____ day of _____, 20__.

(SEAL)

Notary Public

My Commission Expires:

STATE OF NORTH CAROLINA
COUNTY OF _____

I, _____, a Notary Public duly commissioned and qualified to act in _____ County, State of _____, do hereby certify that _____, Attorney-in Fact for _____, a corporation, personally appeared before me this day, and being by me duly sworn, says that (s)he executed the foregoing and attached Payment and Performance Bonds, dated _____, 20__, for and in behalf of _____ as Surety and that his authority to execute and acknowledge said Bonds is contained in an instrument duly executed, acknowledged, and recorded in the Office of Register of Deeds of _____ County, State of _____, on the _____ day of _____, 20__, being recorded in Book Number _____, Page _____, of said Registry, and that the foregoing and attached Bonds were executed under and by virtue of the authority given by said instrument granting (him) (her) the said _____, Power of Attorney; and that the said _____

_____, Attorney-in-Fact, acknowledged the due execution of the foregoing and annexed Bonds for the purpose therein expressed for and in behalf of said _____.

Witness my hand and notarial seal this the _____ day of _____, 20__.

(SEAL)

Notary Public

My Commission Expires:

This page intentionally left blank.

00700
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	6
Article 2—Preliminary Matters	7
2.01 Delivery of Performance and Payment Bonds; Evidence of Insurance.....	7
2.02 Copies of Documents	7
2.03 Before Starting Construction	7
2.04 Preconstruction Conference; Designation of Authorized Representatives	8
2.05 Acceptance of Schedules	8
2.06 Electronic Transmittals	8
Article 3—Contract Documents: Intent, Requirements, Reuse.....	9
3.01 Intent.....	9
3.02 Reference Standards.....	9
3.03 Reporting and Resolving Discrepancies	10
3.04 Requirements of the Contract Documents.....	10
3.05 Reuse of Documents	11
Article 4—Commencement and Progress of the Work	11
4.01 Commencement of Contract Times; Notice to Proceed.....	11
4.02 Starting the Work.....	11
4.03 Reference Points	11
4.04 Progress Schedule	12
4.05 Delays in Contractor’s Progress	12
Article 5—Site; Subsurface and Physical Conditions; Hazardous Environmental Conditions	13
5.01 Availability of Lands	13
5.02 Use of Site and Other Areas.....	14
5.03 Subsurface and Physical Conditions.....	15

5.04	Differing Subsurface or Physical Conditions	16
5.05	Underground Facilities.....	17
5.06	Hazardous Environmental Conditions at Site	19
Article 6—Bonds and Insurance.....		21
6.01	Performance, Payment, and Other Bonds	21
6.02	Insurance—General Provisions.....	22
6.03	Contractor’s Insurance.....	24
6.04	Builder’s Risk and Other Property Insurance	25
6.05	Property Losses; Subrogation	25
6.06	Receipt and Application of Property Insurance Proceeds	27
Article 7—Contractor’s Responsibilities		27
7.01	Contractor’s Means and Methods of Construction	27
7.02	Supervision and Superintendence	27
7.03	Labor; Working Hours	27
7.04	Services, Materials, and Equipment	28
7.05	“Or Equals”	28
7.06	Substitutes	29
7.07	Concerning Subcontractors and Suppliers.....	31
7.08	Patent Fees and Royalties.....	32
7.09	Permits	33
7.10	Taxes	33
7.11	Laws and Regulations.....	33
7.12	Record Documents.....	33
7.13	Safety and Protection	34
7.14	Hazard Communication Programs	35
7.15	Emergencies.....	35
7.16	Submittals	35
7.17	Contractor’s General Warranty and Guarantee	38
7.18	Indemnification	39
7.19	Delegation of Professional Design Services	39
Article 8—Other Work at the Site.....		40
8.01	Other Work	40
8.02	Coordination	41

8.03	Legal Relationships.....	41
Article 9—Owner’s Responsibilities		42
9.01	Communications to Contractor	42
9.02	Replacement of Engineer	42
9.03	Furnish Data	42
9.04	Pay When Due.....	42
9.05	Lands and Easements; Reports, Tests, and Drawings	43
9.06	Insurance.....	43
9.07	Change Orders	43
9.08	Inspections, Tests, and Approvals.....	43
9.09	Limitations on Owner’s Responsibilities	43
9.10	Undisclosed Hazardous Environmental Condition.....	43
9.11	Evidence of Financial Arrangements.....	43
9.12	Safety Programs	43
Article 10—Engineer’s Status During Construction		44
10.01	Owner’s Representative.....	44
10.02	Visits to Site.....	44
10.03	Resident Project Representative.....	44
10.04	Engineer’s Authority	44
10.05	Determinations for Unit Price Work	45
10.06	Decisions on Requirements of Contract Documents and Acceptability of Work	45
10.07	Limitations on Engineer’s Authority and Responsibilities	45
10.08	Compliance with Safety Program.....	45
Article 11—Changes to the Contract		46
11.01	Amending and Supplementing the Contract	46
11.02	Change Orders	46
11.03	Work Change Directives.....	46
11.04	Field Orders.....	47
11.05	Owner-Authorized Changes in the Work	47
11.06	Unauthorized Changes in the Work.....	47
11.07	Change of Contract Price	47
11.08	Change of Contract Times.....	49
11.09	Change Proposals.....	49

11.10	Notification to Surety.....	50
Article 12—Claims.....		50
12.01	Claims	50
Article 13—Cost of the Work; Allowances; Unit Price Work		51
13.01	Cost of the Work	51
13.02	Allowances	55
13.03	Unit Price Work	55
Article 14—Tests and Inspections; Correction, Removal, or Acceptance of Defective Work		56
14.01	Access to Work.....	56
14.02	Tests, Inspections, and Approvals.....	56
14.03	Defective Work	57
14.04	Acceptance of Defective Work.....	58
14.05	Uncovering Work	58
14.06	Owner May Stop the Work	58
14.07	Owner May Correct Defective Work.....	59
Article 15—Payments to Contractor; Set-Offs; Completion; Correction Period		59
15.01	Progress Payments.....	59
15.02	Contractor’s Warranty of Title	62
15.03	Substantial Completion.....	62
15.04	Partial Use or Occupancy	63
15.05	Final Inspection	64
15.06	Final Payment.....	64
15.07	Waiver of Claims	65
15.08	Correction Period	66
Article 16—Suspension of Work and Termination		67
16.01	Owner May Suspend Work	67
16.02	Owner May Terminate for Cause.....	67
16.03	Owner May Terminate for Convenience.....	68
16.04	Contractor May Stop Work or Terminate	68
Article 17—Final Resolution of Disputes		69
17.01	Methods and Procedures.....	69
Article 18—Miscellaneous		69
18.01	Giving Notice	69

18.02	Computation of Times.....	69
18.03	Cumulative Remedies	70
18.04	Limitation of Damages	70
18.05	No Waiver	70
18.06	Survival of Obligations	70
18.07	Controlling Law	70
18.08	Assignment of Contract.....	70
18.09	Successors and Assigns	70
18.10	Headings.....	70

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

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

- requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract.
- b. A demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal, or seeking resolution of a contractual issue that Engineer has declined to address.
 - c. A demand or assertion by Owner or Contractor, duly submitted in compliance with the procedural requirements set forth herein, made pursuant to Paragraph 12.01.A.4, concerning disputes arising after Engineer has issued a recommendation of final payment.
 - d. A demand for money or services by a third party is not a Claim.
11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), lead-based paint (as defined by the HUD/EPA standard), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to Laws and Regulations regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
12. *Contract*—The entire and integrated written contract between Owner and Contractor concerning the Work.
13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents.
15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
17. *Cost of the Work*—See Paragraph 13.01 for definition.
18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
20. *Electronic Document*—Any Project-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.
21. *Electronic Means*—Electronic mail (email), upload/download from a secure Project website, or other communications methods that allow: (a) the transmission or communication of Electronic Documents; (b) the documentation of transmissions, including sending and receipt; (c) printing of the transmitted Electronic Document by the

recipient; (d) the storage and archiving of the Electronic Document by sender and recipient; and (e) the use by recipient of the Electronic Document for purposes permitted by this Contract. Electronic Means does not include the use of text messaging, or of Facebook, Twitter, Instagram, or similar social media services for transmission of Electronic Documents.

22. *Engineer*—The individual or entity named as such in the Agreement.
23. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
24. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto.
 - a. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.
 - b. The presence of Constituents of Concern that are to be removed or remediated as part of the Work is not a Hazardous Environmental Condition.
 - c. The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.
25. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and binding decrees, resolutions, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
26. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
27. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date, or by a time prior to Substantial Completion of all the Work.
28. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.
29. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
30. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
31. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising Contractor's plan to accomplish the Work within the Contract Times.
32. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

33. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative (RPR) includes any assistants or field staff of Resident Project Representative.
34. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
35. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals.
36. *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.
37. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.
38. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands or areas furnished by Owner which are designated for the use of Contractor.
39. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
40. *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.
41. *Submittal*—A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Engineer, or that is indicated as a Submittal in the Schedule of Submittals accepted by Engineer. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers' instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Project photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Change Proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.
42. *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 of such Work.

43. *Successful Bidder*—The Bidder to which the Owner makes an award of contract.
44. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
45. *Supplier*—A manufacturer, fabricator, supplier, distributor, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
46. *Technical Data*
- a. Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (1) existing subsurface conditions at or adjacent to the Site, or existing physical conditions at or adjacent to the Site including existing surface or subsurface structures (except Underground Facilities) or (2) Hazardous Environmental Conditions at the Site.
 - b. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then Technical Data is defined, with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06, as the data contained in boring logs, recorded measurements of subsurface water levels, assessments of the condition of subsurface facilities, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical, environmental, or other Site or facilities conditions report prepared for the Project and made available to Contractor.
 - c. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data, and instead Underground Facilities are shown or indicated on the Drawings.
47. *Underground Facilities*—All active or not-in-service underground lines, pipelines, conduits, ducts, encasements, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or systems at the Site, including but not limited to those facilities or systems that produce, transmit, distribute, or convey telephone or other communications, cable television, fiber optic transmissions, power, electricity, light, heat, gases, oil, crude oil products, liquid petroleum products, water, steam, waste, wastewater, storm water, other liquids or chemicals, or traffic or other control systems. An abandoned facility or system is not an Underground Facility.
48. *Unit Price Work*—Work to be paid for on the basis of unit prices.
49. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.
50. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 Terminology

- A. The words and terms discussed in Paragraphs 1.02.B, C, D, and E are not defined terms that require initial capital letters, but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:* The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.
- C. *Day:* The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:* The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - 1. does not conform to the Contract Documents;
 - 2. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - 3. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or Paragraph 15.04).
- E. *Furnish, Install, Perform, Provide*
 - 1. The word “furnish,” when used in connection with services, materials, or equipment, means 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, means 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, means to furnish and install said services, materials, or equipment complete and ready for intended use.
 - 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

- F. *Contract Price or Contract Times*: References to a change in “Contract Price or Contract Times” or “Contract Times or Contract Price” or similar, indicate that such change applies to (1) Contract Price, (2) Contract Times, or (3) both Contract Price and Contract Times, as warranted, even if the term “or both” is not expressed.
- G. 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 Performance and Payment Bonds; Evidence of Insurance*

- A. *Performance and Payment Bonds*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner the performance bond and payment bond (if the Contract requires Contractor to furnish such bonds).
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each additional insured (as identified in the Contract), the certificates, endorsements, and other evidence of insurance required to be provided by Contractor in accordance with Article 6, except to the extent the Supplementary Conditions expressly establish other dates for delivery of specific insurance policies.
- C. *Evidence of Owner’s Insurance*: After receipt of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each additional insured (as identified in the Contract), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

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

2.03 *Before Starting Construction*

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), Contractor shall submit to Engineer for timely review:
 - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work

into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

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

2.05 *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 the schedules submitted in accordance with Paragraph 2.03.A. No progress payment will be made to Contractor until acceptable schedules are submitted to Engineer.
 - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 - 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 - 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.
 - 4. If a schedule is not acceptable, Contractor will have an additional 10 days to revise and resubmit the schedule.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may send, and shall accept, Electronic Documents transmitted by Electronic Means.
- B. If the Contract does not establish protocols for Electronic Means, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. Subject to any governing protocols for Electronic Means, when transmitting Electronic Documents by Electronic Means, the transmitting party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the Electronic Documents.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one Contract Document is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic versions of the Contract Documents (including any printed copies derived from such electronic versions) and the printed record version, the printed record version will govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.
- F. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation will be deemed stricken, and all remaining provisions will continue to be valid and binding upon Owner and Contractor, which agree that the Contract Documents will 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.
- G. Nothing in the Contract Documents creates:
 - 1. any contractual relationship between Owner or Engineer and any Subcontractor, Supplier, or other individual or entity performing or furnishing any of the Work, for the benefit of such Subcontractor, Supplier, or other individual or entity; or
 - 2. any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity, except as may otherwise be required by Laws and Regulations.

3.02 *Reference Standards*

- A. *Standards Specifications, Codes, Laws and Regulations*
 - 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, means the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 - 2. No provision of any such standard specification, manual, reference standard, or code, and no instruction of a Supplier, will be effective to change the duties or responsibilities of Owner, Contractor, or Engineer from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner or Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility

inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

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

B. *Resolving Discrepancies*

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

3.04 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer in writing all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work.

- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly notify Owner and Contractor in writing that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

- A. Contractor and its Subcontractors and Suppliers shall not:
 - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media versions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or
 - 2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein precludes Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the 30th day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the 60th day after the day of Bid opening or the 30th day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

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

4.03 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the

established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

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

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Such an adjustment will be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
 - 1. Severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 - 2. Abnormal weather conditions;
 - 3. Acts or failures to act of third-party utility owners or other third-party entities (other than those third-party utility owners or other third-party entities performing other work at or adjacent to the Site as arranged by or under contract with Owner, as contemplated in Article 8); and
 - 4. Acts of war or terrorism.

- D. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:
1. Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.
 2. Contractor shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.
 3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 11.
- E. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:
1. The circumstances that form the basis for the requested adjustment;
 2. The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;
 3. The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;
 4. The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and
 5. The impact on Contract Price, in accordance with the provisions of Paragraph 11.07.
- Contractor shall also furnish such additional supporting documentation as Owner or Engineer may require including, where appropriate, a revised progress schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.
- F. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5, together with the provisions of Paragraphs 4.05.D and 4.05.E.
- G. Paragraph 8.03 addresses delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

ARTICLE 5—SITE; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

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

- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

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

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas, or to improvements, structures, utilities, or similar facilities located at such adjacent lands or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris will conform to applicable Laws and Regulations.
 - C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment

and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

- D. *Loading of Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:

1. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data;
2. Those drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data; and
3. Technical Data contained in such reports and drawings.

- B. *Underground Facilities:* Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05, and not in the drawings referred to in Paragraph 5.03.A. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

- C. *Reliance by Contractor on Technical Data:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b.

- D. *Limitations of Other Data and Documents:* Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings;
3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or
4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

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

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

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine whether it is necessary for Owner to obtain additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the subsurface or physical condition in question may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the condition in question has been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- E. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in

Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

- a. Such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,
 - c. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
 - a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise;
 - b. The existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice required by Paragraph 5.04.A.
 3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
 4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.
- F. *Underground Facilities; Hazardous Environmental Conditions:* Paragraph 5.05 governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 5.06 governs rights and responsibilities regarding Hazardous Environmental Conditions. The provisions of Paragraphs 5.03 and 5.04 are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* Unless it is otherwise expressly provided in the Supplementary Conditions, the cost of all of the following are included in the Contract Price, and Contractor shall have full responsibility for:
1. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 2. complying with applicable state and local utility damage prevention Laws and Regulations;

3. verifying the actual location of those Underground Facilities shown or indicated in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;
 4. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 5. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, or was not shown or indicated on the Drawings with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing regarding such Underground Facility.
- C. *Engineer's Review:* Engineer will:
1. promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy;
 2. identify and communicate with the owner of the Underground Facility; prepare recommendations to Owner (and if necessary issue any preliminary instructions to Contractor) regarding the Contractor's resumption of Work in connection with the Underground Facility in question;
 3. obtain any pertinent cost or schedule information from Contractor; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and
 4. advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the Underground Facility may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- F. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown

or indicated on the Drawings, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

- a. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - b. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E; and
 - c. Contractor gave the notice required in Paragraph 5.05.B.
2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.
 4. The information and data shown or indicated on the Drawings with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in an investigation conducted in accordance with the current edition of ASCE 38, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, by the American Society of Civil Engineers. If such information or data is incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph 5.05.F.

5.06 *Hazardous Environmental Conditions at Site*

A. *Reports and Drawings:* The Supplementary Conditions identify:

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

B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures

- of construction to be employed by Contractor, and safety precautions and programs incident thereto;
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.
- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, as a result of such Work stoppage, such special conditions under which Work is agreed to be resumed by Contractor, or any costs or expenses incurred in response to the Hazardous Environmental Condition, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.
- H. If, after receipt of such written notice, Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special

conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court, arbitration, or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I obligates Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J obligates Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of Contractor's obligations under the Contract. These bonds must remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the terms of a prescribed bond form, the Supplementary Conditions, or other provisions of the Contract.
- B. Contractor shall also furnish such other bonds (if any) as are required by the Supplementary Conditions or other provisions of the Contract.
- C. All bonds must be in the form included in the Bidding Documents or otherwise specified by Owner prior to execution of the Contract, except as provided otherwise by Laws or

Regulations, and must be issued and signed by a surety named in “Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies” as published in Department Circular 570 (as amended and supplemented) by the Bureau of the Fiscal Service, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual’s authority to bind the surety. The evidence of authority must show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

- D. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.
- E. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer in writing and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the bond and surety requirements above.
- F. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner’s termination rights under Article 16.
- G. Upon request to Owner from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Owner shall provide a copy of the payment bond to such person or entity.
- H. Upon request to Contractor from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Contractor shall provide a copy of the payment bond to such person or entity.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized in the state or jurisdiction in which the Project is located to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Alternative forms of insurance coverage, including but not limited to self-insurance and “Occupational Accident and Excess Employer’s Indemnity Policies,” are not sufficient to meet the insurance requirements of this Contract, unless expressly allowed in the Supplementary Conditions.
- D. Contractor shall deliver to Owner, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Contractor has obtained and is maintaining the policies and coverages required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, full disclosure of all relevant exclusions, and evidence of insurance required to be purchased and maintained by

Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.

- E. Owner shall deliver to Contractor, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Owner has obtained and is maintaining the policies and coverages required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, and full disclosure of all relevant exclusions. In any documentation furnished under this provision, Owner may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those relevant to this Contract.
- F. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, will not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- G. In addition to the liability insurance required to be provided by Contractor, the Owner, at Owner's option, may purchase and maintain Owner's own liability insurance. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.
- H. Contractor shall require:
 - 1. Subcontractors to purchase and maintain worker's compensation, commercial general liability, and other insurance that is appropriate for their participation in the Project, and to name as additional insureds Owner and Engineer (and any other individuals or entities identified in the Supplementary Conditions as additional insureds on Contractor's liability policies) on each Subcontractor's commercial general liability insurance policy; and
 - 2. Suppliers to purchase and maintain insurance that is appropriate for their participation in the Project.
- I. If either party does not purchase or maintain the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.
- J. If Contractor has failed to obtain and maintain required insurance, Contractor's entitlement to enter or remain at the Site will end immediately, and Owner may impose an appropriate set-off against payment for any associated costs (including but not limited to the cost of purchasing necessary insurance coverage), and exercise Owner's termination rights under Article 16.
- K. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect (but is in no way obligated) to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price will be adjusted accordingly.

- L. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary.
- M. The insurance and insurance limits required herein will not be deemed as a limitation on Contractor's liability, or that of its Subcontractors or Suppliers, under the indemnities granted to Owner and other individuals and entities in the Contract or otherwise.
- N. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured and Engineer.

6.03 *Contractor's Insurance*

- A. *Required Insurance:* Contractor shall purchase and maintain Worker's Compensation, Commercial General Liability, and other insurance pursuant to the specific requirements of the Supplementary Conditions.
- B. *General Provisions:* The policies of insurance required by this Paragraph 6.03 as supplemented must:
 - 1. include at least the specific coverages required;
 - 2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;
 - 3. remain in effect at least until the Work is complete (as set forth in Paragraph 15.06.D), and longer if expressly required elsewhere in this Contract, and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract;
 - 4. apply with respect to the performance of the Work, whether such performance is 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; and
 - 5. include all necessary endorsements to support the stated requirements.
- C. *Additional Insureds:* The Contractor's commercial general liability, automobile liability, employer's liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:
 - 1. include and list as additional insureds Owner and Engineer, and any individuals or entities identified as additional insureds in the Supplementary Conditions;
 - 2. include coverage for the respective officers, directors, members, partners, employees, and consultants of all such additional insureds;
 - 3. afford primary coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations);

4. not seek contribution from insurance maintained by the additional insured; and
5. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Contractor's acts or omissions, or the acts and omissions of those working on Contractor's behalf, in the performance of Contractor's operations.

6.04 *Builder's Risk and Other Property Insurance*

- A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). The specific requirements applicable to the builder's risk insurance are set forth in the Supplementary Conditions.
- B. *Property Insurance for Facilities of Owner Where Work Will Occur*: Owner is responsible for obtaining and maintaining property insurance covering each existing structure, building, or facility in which any part of the Work will occur, or to which any part of the Work will attach or be adjoined. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, providing coverage consistent with that required for the builder's risk insurance, and will be maintained until the Work is complete, as set forth in Paragraph 15.06.D.
- C. *Property Insurance for Substantially Complete Facilities*: Promptly after Substantial Completion, and before actual occupancy or use of the substantially completed Work, Owner will obtain property insurance for such substantially completed Work, and maintain such property insurance at least until the Work is complete, as set forth in Paragraph 15.06.D. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, and provide coverage consistent with that required for the builder's risk insurance. The builder's risk insurance may terminate upon written confirmation of Owner's procurement of such property insurance.
- D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide advance notice of such occupancy or use to the builder's risk insurer, and obtain an endorsement consenting to the continuation of coverage prior to commencing such partial occupancy or use.
- E. *Insurance of Other Property; Additional Insurance*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, then the entity or individual owning such property item will be responsible for insuring it. If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.04, it may do so at Contractor's expense.

6.05 *Property Losses; Subrogation*

- A. The builder's risk insurance policy purchased and maintained in accordance with Paragraph 6.04 (or an installation floater policy if authorized by the Supplementary Conditions), will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against

Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors.

1. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils, risks, or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused.
 2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Any property insurance policy maintained by Owner covering any loss, damage, or consequential loss to Owner's existing structures, buildings, or facilities in which any part of the Work will occur, or to which any part of the Work will attach or adjoin; to adjacent structures, buildings, or facilities of Owner; or to part or all of the completed or substantially completed Work, during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06, will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them, and that the insured is allowed to waive the insurer's rights of subrogation in a written contract executed prior to the loss, damage, or consequential loss.
1. 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 all losses and damages caused by, arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.
- C. The waivers in this Paragraph 6.05 include the waiver of rights 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 insured peril, risk, or cause of loss.
- D. Contractor shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

6.06 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of property insurance required by Paragraph 6.04 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.
- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.04 shall maintain such proceeds in a segregated account, and distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, Contractor shall repair or replace the damaged Work, using allocated insurance proceeds.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 *Contractor's Means and Methods of Construction*

- A. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. If the Contract Documents note, or Contractor determines, that professional engineering or other design services are needed to carry out Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures, or for Site safety, then Contractor shall cause such services to be provided by a properly licensed design professional, at Contractor's expense. Such services are not Owner-delegated professional design services under this Contract, and neither Owner nor Engineer has any responsibility with respect to (1) Contractor's determination of the need for such services, (2) the qualifications or licensing of the design professionals retained or employed by Contractor, (3) the performance of such services, or (4) any errors, omissions, or defects in such services.

7.02 *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.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who will not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.03 *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 maintain good discipline and order at the Site.

- B. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of Contractor's employees; of Suppliers and Subcontractors, and their employees; and of any other individuals or entities performing or furnishing any of the Work, just as Contractor is responsible for Contractor's own acts and omissions.
- C. 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 will be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.04 *Services, Materials, and Equipment*

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

7.05 *"Or Equals"*

- A. *Contractor's Request; Governing Criteria:* Whenever an item of equipment or material is specified or described in the Contract Documents by using the names of one or more proprietary items or specific Suppliers, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material, or items from other proposed Suppliers, under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of equipment or material proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer will deem it an "or equal" item. For the purposes of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that the proposed item:
 - 1) is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

- 2) will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) has a proven record of performance and availability of responsive service; and
 - 4) is not objectionable to Owner.
- b. Contractor certifies that, if the proposed item is approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) the item will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. *Contractor's Expense*: Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal," which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.
- D. *Effect of Engineer's Determination*: Neither approval nor denial of an "or-equal" request will result in any change in Contract Price. The Engineer's denial of an "or-equal" request will be final and binding, and may not be reversed through an appeal under any provision of the Contract.
- E. *Treatment as a Substitution Request*: If Engineer determines that an item of equipment or material proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the item a proposed substitute pursuant to Paragraph 7.06.

7.06 Substitutes

- A. *Contractor's Request; Governing Criteria*: Unless the specification or description of an item of equipment or material required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material under the circumstances described below. To the extent possible such requests must be made before commencement of related construction at the Site.
1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of equipment or material from anyone other than Contractor.
 2. The requirements for review by Engineer will be as set forth in Paragraph 7.06.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

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

- E. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
- F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request will be final and binding, and may not be reversed through an appeal under any provision of the Contract. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.06.D, by timely submittal of a Change Proposal.

7.07 *Concerning Subcontractors and Suppliers*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.
- B. Contractor shall retain specific Subcontractors and Suppliers for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor or Supplier to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within 5 days.
- E. Owner may require the replacement of any Subcontractor or Supplier. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors or Suppliers for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor or Supplier so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor or Supplier.
- F. If Owner requires the replacement of any Subcontractor or Supplier retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor or Supplier, whether initially or as a replacement, will constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

- H. On a monthly basis, Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors and Suppliers.
- J. The divisions and sections of the Specifications and the identifications of any Drawings do not control Contractor in dividing the Work among Subcontractors or Suppliers, or in delineating the Work to be performed by any specific trade.
- K. All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract for the benefit of Owner and Engineer.
- L. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor for Work performed for Contractor by the Subcontractor or Supplier.
- M. Contractor shall restrict all Subcontractors and Suppliers from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed in this Contract.

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

7.09 *Permits*

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

7.10 *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.

7.11 *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. Neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It is not Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this does not relieve Contractor of its obligations under Paragraph 3.03.
- C. Owner or Contractor may give written notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such written notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

7.13 *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.
- B. Contractor shall designate a qualified and experienced safety representative whose duties and responsibilities are the prevention of Work-related accidents and the maintenance and supervision of safety precautions and programs.
- C. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;
 - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- D. All damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- E. 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.
- F. Contractor shall notify Owner; the owners of adjacent property; the owners of Underground Facilities and other utilities (if the identity of such owners is known to Contractor); and other contractors and utility owners performing work at or adjacent to the Site, in writing, when Contractor knows that prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
- G. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. Any Owner's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.
- H. 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.

- I. Contractor's duties and responsibilities for safety and protection will continue until all the Work is completed, Engineer has issued a written notice to Owner and Contractor in accordance with Paragraph 15.06.C that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).
- J. Contractor's duties and responsibilities for safety and protection will resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.14 *Hazard Communication Programs*

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

7.15 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent 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 by an emergency, or are required as a result of Contractor's response to an emergency. If Engineer determines that a change in the Contract Documents is required because of an emergency or Contractor's response, a Work Change Directive or Change Order will be issued.

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

- 1. Before submitting a Shop Drawing or Sample, Contractor shall:
 - a. review and coordinate the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determine and verify:
 - 1) all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal;
 - 2) the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - 3) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto;
 - c. confirm that the Submittal is complete with respect to all related data included in the Submittal.
- 2. Each Shop Drawing or Sample must bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that Submittal, and that Contractor approves the Submittal.

3. With each Shop Drawing or Sample, Contractor shall give Engineer specific written notice of any variations that the Submittal may have from the requirements of the Contract Documents. This notice must be set forth in a written communication separate from the Submittal; and, in addition, in the case of a Shop Drawing by a specific notation made on the Shop Drawing itself.
- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall label and submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals.
1. *Shop Drawings*
 - a. Contractor shall submit the number of copies required in the Specifications.
 - b. Data shown on the Shop Drawings must be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide, and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.C.
 2. *Samples*
 - a. Contractor shall submit the number of Samples required in the Specifications.
 - b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the Submittal for the limited purposes required by Paragraph 7.16.C.
 3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Engineer's Review of Shop Drawings and Samples*
1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the accepted Schedule of Submittals. 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, comply with the requirements of the Contract Documents, and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
 2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction, or to safety precautions or programs incident thereto.
 3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
 4. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will

document any such approved variation from the requirements of the Contract Documents in a Field Order or other appropriate Contract modification.

5. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 7.16.A and B.
6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, will not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
7. Neither Engineer's receipt, review, acceptance, or approval of a Shop Drawing or Sample will result in such item becoming a Contract Document.
8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.C.4.

D. Resubmittal Procedures for Shop Drawings and Samples

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 Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required approval of an item with no more than two resubmittals. Engineer will record Engineer's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

E. Submittals Other than Shop Drawings, Samples, and Owner-Delegated Designs

1. The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:
 - a. Contractor shall submit all such Submittals to the Engineer in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.
 - b. Engineer will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.
 - c. Engineer's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.

- d. If any such Submittal is not accepted, Contractor shall confer with Engineer regarding the reason for the non-acceptance, and resubmit an acceptable document.
- 2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.03, 2.04, and 2.05.
- F. Owner-delegated Designs: Submittals pursuant to Owner-delegated designs are governed by the provisions of Paragraph 7.19.

7.17 Contractor's General Warranty and Guarantee

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer is entitled to rely on Contractor's warranty and guarantee.
- B. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 15.08. The time in which Owner may enforce its warranty and guarantee rights under this Paragraph 7.17 is limited only by applicable Laws and Regulations restricting actions to enforce such rights; provided, however, that after the end of the correction period under Paragraph 15.08:
 - 1. Owner shall give Contractor written notice of any defective Work within 60 days of the discovery that such Work is defective; and
 - 2. Such notice will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the notice.
- C. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 - 1. abuse, or improper modification, 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.
- D. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents, a release of Contractor's obligation to perform the Work in accordance with the Contract Documents, or a release of Owner's warranty and guarantee rights under this Paragraph 7.17:
 - 1. Observations by Engineer;
 - 2. Recommendation by Engineer or payment by Owner of any progress or final payment;
 - 3. The issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 - 4. Use or occupancy of the Work or any part thereof by Owner;
 - 5. Any review and approval of a Shop Drawing or Sample submittal;
 - 6. The issuance of a notice of acceptability by Engineer;
 - 7. The end of the correction period established in Paragraph 15.08;
 - 8. Any inspection, test, or approval by others; or

9. Any correction of defective Work by Owner.
- E. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract will govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 Indemnification

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from losses, damages, costs, and judgments (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 from third-party claims or actions relating to or resulting from the performance or furnishing of the Work, provided that any such claim, action, loss, cost, judgment or damage is attributable to bodily injury, sickness, disease, or death, or to damage to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A will 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.

7.19 Delegation of Professional Design Services

- A. Owner may require Contractor to provide professional design services for a portion of the Work by express delegation in the Contract Documents. Such delegation will specify the performance and design criteria that such services must satisfy, and the Submittals that Contractor must furnish to Engineer with respect to the Owner-delegated design.
- B. Contractor shall cause such Owner-delegated professional design services to be provided pursuant to the professional standard of care by a properly licensed design professional, whose signature and seal must appear on all drawings, calculations, specifications, certifications, and Submittals prepared by such design professional. Such design professional must issue all certifications of design required by Laws and Regulations.
- C. If a Shop Drawing or other Submittal related to the Owner-delegated design is prepared by Contractor, a Subcontractor, or others for submittal to Engineer, then such Shop Drawing or other Submittal must bear the written approval of Contractor's design professional when submitted by Contractor to Engineer.

- D. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, and approvals performed or provided by the design professionals retained or employed by Contractor under an Owner-delegated design, subject to the professional standard of care and the performance and design criteria stated in the Contract Documents.
- E. Pursuant to this Paragraph 7.19, Engineer's review, approval, and other determinations regarding design drawings, calculations, specifications, certifications, and other Submittals furnished by Contractor pursuant to an Owner-delegated design will be only for the following limited purposes:
 - 1. Checking for conformance with the requirements of this Paragraph 7.19;
 - 2. Confirming that Contractor (through its design professionals) has used the performance and design criteria specified in the Contract Documents; and
 - 3. Establishing that the design furnished by Contractor is consistent with the design concept expressed in the Contract Documents.
- F. Contractor shall not be responsible for the adequacy of performance or design criteria specified by Owner or Engineer.
- G. Contractor is not required to provide professional services in violation of applicable Laws and Regulations.

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any third-party utility work that Owner has arranged to take place at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work.
- D. 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.

- E. If the proper execution or results of any part of Contractor's Work depends upon work performed by others, 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.
- F. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 4.05.C.3.

8.02 *Coordination*

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

8.03 *Legal Relationships*

- A. If, in the course of performing other work for Owner at or adjacent to the Site, the Owner's employees, any other contractor working for Owner, or any utility owner that Owner has arranged to perform work, causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment will take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract, and any remedies available to Contractor under Laws or Regulations concerning utility action or inaction. When applicable, any such equitable adjustment in Contract Price will be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times or Contract Price is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.
 - 1. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this Paragraph 8.03.B.
 - 2. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due Contractor.
- C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

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

9.02 *Replacement of Engineer*

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

9.03 *Furnish Data*

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

9.04 *Pay When Due*

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

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

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

9.06 *Insurance*

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

9.07 *Change Orders*

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

9.08 *Inspections, Tests, and Approvals*

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

9.09 *Limitations on Owner's Responsibilities*

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

9.10 *Undisclosed Hazardous Environmental Condition*

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

9.11 *Evidence of Financial Arrangements*

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

9.12 *Safety Programs*

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

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

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

10.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe, as an experienced and qualified design professional, the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.07. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Resident Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in the Supplementary Conditions and in Paragraph 10.07.
- B. If Owner designates an individual or entity who is not Engineer's consultant, agent, or employee to represent Owner at the Site, then the responsibilities and authority of such individual or entity will be as provided in the Supplementary Conditions.

10.04 *Engineer's Authority*

- A. Engineer has the authority to reject Work in accordance with Article 14.
- B. Engineer's authority as to Submittals is set forth in Paragraph 7.16.
- C. Engineer's authority as to design drawings, calculations, specifications, certifications and other Submittals from Contractor in response to Owner's delegation (if any) to Contractor of professional design services, is set forth in Paragraph 7.19.
- D. Engineer's authority as to changes in the Work is set forth in Article 11.

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

10.05 *Determinations for Unit Price Work*

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

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

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

10.07 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, will create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation, and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Contractor under Paragraph 15.06.A, will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 10.07 also apply to the Resident Project Representative, if any.

10.08 *Compliance with Safety Program*

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

ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

- A. The Contract may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
- B. If an amendment or supplement to the Contract includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order.
- C. All changes to the Contract that involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, must be supported by Engineer's recommendation. Owner and Contractor may amend other terms and conditions of the Contract without the recommendation of the Engineer.

11.02 *Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
 - 1. Changes in Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 - 2. Changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 - 3. Changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.05, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters; and
 - 4. Changes that embody the substance of any final and binding results under: Paragraph 11.03.B, resolving the impact of a Work Change Directive; Paragraph 11.09, concerning Change Proposals; Article 12, Claims; Paragraph 13.02.D, final adjustments resulting from allowances; Paragraph 13.03.D, final adjustments relating to determination of quantities for Unit Price Work; and similar provisions.
- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of Paragraph 11.02.A, it will be deemed to be of full force and effect, as if fully executed.

11.03 *Work Change Directives*

- A. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.07 regarding change of Contract Price.

- B. If Owner has issued a Work Change Directive and:
 - 1. Contractor believes that an adjustment in Contract Times or Contract Price is necessary, then Contractor shall submit any Change Proposal seeking such an adjustment no later than 30 days after the completion of the Work set out in the Work Change Directive.
 - 2. Owner believes that an adjustment in Contract Times or Contract Price is necessary, then Owner shall submit any Claim seeking such an adjustment no later than 60 days after issuance of the Work Change Directive.

11.04 *Field Orders*

- A. Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly.
- B. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.05 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Changes involving the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters will be supported by Engineer's recommendation.
- B. Such changes in the Work may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work must be performed under the applicable conditions of the Contract Documents.
- C. Nothing in this Paragraph 11.05 obligates Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.06 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.C.2.

11.07 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment of Contract Price must comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:

1. Where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03);
 2. Where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.07.C.2); or
 3. Where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.07.C).
- C. *Contractor's Fee:* When applicable, the Contractor's fee for overhead and profit will be determined as follows:
1. A mutually acceptable fixed fee; or
 2. If a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. For costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee will be 15 percent;
 - b. For costs incurred under Paragraph 13.01.B.3, the Contractor's fee will be 5 percent;
 - c. Where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.07.C.2.a and 11.07.C.2.b is that the Contractor's fee will be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of 5 percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted Work the maximum total fee to be paid by Owner will be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;
 - d. No fee will be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
 - e. The amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in Cost of the Work will be the amount of the actual net decrease in Cost of the Work and a deduction of an additional amount equal to 5 percent of such actual net decrease in Cost of the Work; and
 - f. When both additions and credits are involved in any one change or Change Proposal, the adjustment in Contractor's fee will be computed by determining the sum of the costs in each of the cost categories in Paragraph 13.01.B (specifically, payroll costs, Paragraph 13.01.B.1; incorporated materials and equipment costs, Paragraph 13.01.B.2; Subcontract costs, Paragraph 13.01.B.3; special consultants costs, Paragraph 13.01.B.4; and other costs, Paragraph 13.01.B.5) and applying to each such cost category sum the appropriate fee from Paragraphs 11.07.C.2.a through 11.07.C.2.e, inclusive.

11.08 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment in the Contract Times must comply with the provisions of Article 12.
- B. Delay, disruption, and interference in the Work, and any related changes in Contract Times, are addressed in and governed by Paragraph 4.05.

11.09 *Change Proposals*

- A. *Purpose and Content:* Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; contest an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; challenge a set-off against payment due; or seek other relief under the Contract. The Change Proposal will specify any proposed change in Contract Times or Contract Price, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents. Each Change Proposal will address only one issue, or a set of closely related issues.

- B. *Change Proposal Procedures*

- 1. *Submittal:* Contractor shall submit each Change Proposal to Engineer within 30 days after the start of the event giving rise thereto, or after such initial decision.
- 2. *Supporting Data:* The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal.
 - a. Change Proposals based on or related to delay, interruption, or interference must comply with the provisions of Paragraphs 4.05.D and 4.05.E.
 - b. Change proposals related to a change of Contract Price must include full and detailed accounts of materials incorporated into the Work and labor and equipment used for the subject Work.

The supporting data must be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event.

- 3. *Engineer's Initial Review:* Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal. If in its discretion Engineer concludes that additional supporting data is needed before conducting a full review and making a decision regarding the Change Proposal, then Engineer may request that Contractor submit such additional supporting data by a date specified by Engineer, prior to Engineer beginning its full review of the Change Proposal.
- 4. *Engineer's Full Review and Action on the Change Proposal:* Upon receipt of Contractor's supporting data (including any additional data requested by Engineer), Engineer will conduct a full review of each Change Proposal and, within 30 days after such receipt of the Contractor's supporting data, either approve the Change Proposal in whole, deny it in whole, or approve it in part and deny it in part. Such actions must be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change

Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

5. *Binding Decision*: Engineer's decision is final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- C. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties in writing that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice will be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.
- D. *Post-Completion*: Contractor shall not submit any Change Proposals after Engineer issues a written recommendation of final payment pursuant to Paragraph 15.06.B.

11.10 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

ARTICLE 12—CLAIMS

12.01 *Claims*

- A. *Claims Process*: The following disputes between Owner and Contractor are subject to the Claims process set forth in this article:
 1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents;
 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters; and
 4. Subject to the waiver provisions of Paragraph 15.07, any dispute arising after Engineer has issued a written recommendation of final payment pursuant to Paragraph 15.06.B.
- B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim rests with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge

and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

- C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim will be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation*
 - 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate will stay the Claim submittal and response process.
 - 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process will resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process will resume as of the date of the conclusion of the mediation, as determined by the mediator.
 - 3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action will be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim will be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
- G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim will be incorporated in a Change Order or other written document to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

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

13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
 - 1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

2. When needed to determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included:* Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will 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 in advance of the subject Work. Such employees include, without limitation, superintendents, foremen, safety managers, safety representatives, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will 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 accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will 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, which 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 will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
 4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed or retained for services specifically related to the Work.
 5. Other costs consisting of 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, 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.

- 1) In establishing included costs for materials such as scaffolding, plating, or sheeting, consideration will be given to the actual or the estimated life of the material for use on other projects; or rental rates may be established on the basis of purchase or salvage value of such items, whichever is less. Contractor will not be eligible for compensation for such items in an amount that exceeds the purchase cost of such item.

c. *Construction Equipment Rental*

- 1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.
 - 2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.
 - 3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.
- 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 builder's risk or other property insurance established in accordance with Paragraph 6.04), 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 include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
 - h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
 - i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.
- C. *Costs Excluded:* The term Cost of the Work does not include any of the following items:
 - 1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
 - 2. The cost of purchasing, renting, or furnishing small tools and hand tools.
 - 3. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
 - 4. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
 - 5. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
 - 6. Expenses incurred in preparing and advancing Claims.
 - 7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.
- D. *Contractor's Fee*
 - 1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:
 - a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.
 - b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:
 - 1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.
 - 2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.
 - 2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change

Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work will be determined in accordance with Paragraph 11.07.C.2.

- E. *Documentation and Audit*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor and pertinent Subcontractors will establish and maintain records of the costs in accordance with generally accepted accounting practices. Subject to prior written notice, Owner will be afforded reasonable access, during normal business hours, to all Contractor's accounts, records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and similar data relating to the Cost of the Work and Contractor's fee. Contractor shall preserve all such documents for a period of three years after the final payment by Owner. Pertinent Subcontractors will afford such access to Owner, and preserve such documents, to the same extent required of Contractor.

13.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.
- B. *Cash Allowances*: Contractor agrees that:
1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment for any of the foregoing will be valid.
- C. *Owner's Contingency Allowance*: Contractor agrees that an Owner's contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor for Work covered by allowances, and the Contract Price will be correspondingly adjusted.

13.03 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision

thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, and the final adjustment of Contract Price will be set forth in a Change Order, subject to the provisions of the following paragraph.

E. *Adjustments in Unit Price*

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:
 - a. the quantity of the item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 - b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.
2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.
3. Adjusted unit prices will apply to all units of that item.

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

14.01 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction 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 with such procedures and programs as applicable.

14.02 *Tests, Inspections, and Approvals*

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

- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 3. by manufacturers of equipment furnished under the Contract Documents;
 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

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

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

14.03 *Defective Work*

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

losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

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

14.05 *Uncovering Work*

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

14.06 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work,

or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work will not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 Owner May Correct Defective Work

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace defective Work as required by Engineer, then Owner may, after 7 days' written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

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

15.01 Progress Payments

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

establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and equipment free and clear of all Liens; and (c) evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

3. Beginning with the second Application for Payment, each Application must include an affidavit of Contractor stating that all previous progress payments received by Contractor have been applied to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
4. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. Review of Applications

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work;
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto;
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work;
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid by Owner; or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or
 - e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner*

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. Claims have been made against Owner based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

- b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
 - f. The Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. The Contract Price has been reduced by Change Orders;
 - i. An event has occurred that would constitute a default by Contractor and therefore justify a termination for cause;
 - j. Liquidated or other damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens; or
 - l. Other items entitle Owner to a set-off against the amount recommended.
2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed will be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.
 3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by Paragraph 15.01.D.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than 7 days after the time of payment by Owner.

15.03 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time

submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer 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 preliminary certificate of Substantial Completion which will fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have 7 days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.
- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without

significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through 15.03.E for that part of the Work.
2. At any time, Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.04 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

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

15.06 *Final Payment*

A. *Application for Payment*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.12), and other documents, Contractor may make application for final payment.
2. The final Application for Payment must be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

- d. a list of all duly pending Change Proposals and Claims; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
- 3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.
- B. *Engineer's Review of Final Application and Recommendation of Payment:* If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the final Application for Payment to Owner for payment. Such recommendation will account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. 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. *Notice of Acceptability:* In support of its recommendation of payment of the final Application for Payment, Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to stated limitations in the notice and to the provisions of Paragraph 15.07.
- D. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment and issuance of notice of the acceptability of the Work.
- E. *Final Payment Becomes Due:* Upon receipt from Engineer of the final Application for Payment and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Owner shall pay the resulting balance due to Contractor within 30 days of Owner's receipt of the final Application for Payment from Engineer.

15.07 *Waiver of Claims*

- A. By making final payment, Owner waives its claim or right to liquidated damages or other damages for late completion by Contractor, except as set forth in an outstanding Claim,

appeal under the provisions of Article 17, set-off, or express reservation of rights by Owner. Owner reserves all other claims or rights after final payment.

- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted as a Claim, or appealed under the provisions of Article 17.

15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such adjacent areas;
 - 2. correct such defective Work;
 - 3. remove the defective Work from the Project and replace it with Work that is not defective, if the defective Work has been rejected by Owner, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting from the corrective measures.
- B. Owner shall give any such notice of defect within 60 days of the discovery that such Work or repairs is defective. If such notice is given within such 60 days but after the end of the correction period, the notice will be deemed a notice of defective Work under Paragraph 7.17.B.
- C. If, after receipt of a notice of defect within 60 days and within the correction period, Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all 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). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the failure to pay.
- D. 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.
- E. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

- F. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph are not to be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

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

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
 - 1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment, or failure to adhere to the Progress Schedule);
 - 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 - 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
 - 4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) 10 days' written notice that Owner is considering a declaration that Contractor is in default and termination of the Contract, Owner may proceed to:
 - 1. declare Contractor to be in default, and give Contractor (and any surety) written notice that the Contract is terminated; and
 - 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within 7 days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects,

attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond will govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate for Convenience*

- A. Upon 7 days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and
 - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid for any loss of anticipated profits or revenue, post-termination overhead costs, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon 7 days' written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, 7 days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The

provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17—FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this article:
 - 1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full, pursuant to Article 12; and
 - 2. Disputes between Owner and Contractor concerning the Work, or obligations under the Contract Documents, that arise after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this article, Owner or Contractor may:
 - 1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions;
 - 2. agree with the other party to submit the dispute to another dispute resolution process; or
 - 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18—MISCELLANEOUS

18.01 *Giving Notice*

- A. Whenever any provision of the Contract requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered:
 - 1. in person, by a commercial courier service or otherwise, to the recipient's place of business;
 - 2. by registered or certified mail, postage prepaid, to the recipient's place of business; or
 - 3. by e-mail to the recipient, with the words "Formal Notice" or similar in the e-mail's subject line.

18.02 *Computation of Times*

- A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.03 *Cumulative Remedies*

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

18.04 *Limitation of Damages*

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

18.05 *No Waiver*

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

18.06 *Survival of Obligations*

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

18.07 *Controlling Law*

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

18.08 *Assignment of Contract*

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

18.09 *Successors and Assigns*

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

18.10 *Headings*

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

This page intentionally left blank.

SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

TABLE OF CONTENTS

	Page
Article 1 - Definitions and Terminology	2
Article 2 - Preliminary Matters	3
Article 3 - Contract Documents: Intent, Requirements , Reuse.....	4
Article 4 - Commencement and Progress of the Work.....	4
Article 5 - Site; Subsurface and Physical Conditions; Hazardous Environmental Conditions	6
Article 6 - Bonds and Insurance	6
Article 7 - Contractor's Responsibilities	19
Article 8 - Other Work at the Site.....	25
Article 9 - Owner's Responsibilities	26
Article 10 - Engineer's Status During Construction	26
Article 11 - Changes to the Contract	29
Article 12 - Claims	29
Article 13 - Cost of the Work; Allowances; Unit Price Work	29
Article 14 - Tests and Inspections; Correction, Removal, or Acceptance of Defective Work	31
Article 15 - Payments to Contractor; Set-offs; Completion; Correction Period	32
Article 16 - Suspension of Work and Termination.....	35
Article 17 - Final Resolution of Disputes.....	36
Article 18 - Miscellaneous	37

SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

These Supplementary Conditions amend or supplement EJCDC® C-700, Standard General Conditions of the Construction Contract (2018). The General Conditions remain in full force and effect except as amended.

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

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix “SC” added—for example, “Paragraph SC-4.05.”

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

SC-1.01.A.3. Add the following language to the end of Paragraph 1.01.A.3:

The Application for Payment form to be used on this Project is per City of Raleigh standards. Standard form to be used as a summary and signature sheet is included in Section 00620. Contractor shall use the City’s standard computerized forms, as included in these Contract Documents, for providing detail payment breakdown as an attachment to summary sheet. Contractor shall also include as part of the Application for Payment the “Certificate of the Contractor or His Duly Authorized Representative”.

SC-1.01.A.8. Add the following language to the end of Paragraph 1.01.A.8:

The Change Order form to be used on this Project is the City of Raleigh standard. The Standard Form to be used is included in these Contract Documents.

SC-1.01.A.9. Add the following language to the end of Paragraph 1.01.A.9:

The Change Proposal form to be used on this Project is the City of Raleigh standard. The Standard Form to be used is included in these Contract Documents.

SC-1.01.A.42. Amend the first sentence of Paragraph 1.01.A.42 to read as follows:

The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer and Owner, 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.

SC-1.01.A.51. Add the following definitions after Paragraph 1.01.A.50:

A.51 *City* – City of Raleigh.

A.52 *Minority Business* - A business:

- a. In which at least fifty-one percent (51%) is owned by one or more minority persons or socially and economically disadvantaged individuals, or in the case of a corporation,

in which at least fifty-one percent (51%) of the stock is owned by one or more minority persons or socially and economically disadvantaged individuals; and

- b. Of which the management and daily business operations are controlled by one or more of the minority persons or socially and economically disadvantaged individuals who own it.

A.53 *Minority Person* - A person who is a citizen or lawful permanent resident of the United States and who is:

- a. Black, that is, a person having origins in any of the black racial groups in Africa;
- b. Hispanic, that is, a person of Spanish or Portuguese culture with origins in Mexico, South or Central America, or the Caribbean Islands, regardless of race;
- c. Asian American, that is, a person having origins in any of the original peoples of the Far East, Southeast Asia and Asia, the Indian subcontinent, or the Pacific Islands;
- d. American Indian, that is, a person having origins in any of the original Indian peoples of North America; or
- e. Female.

A.54 *Notice of Violation* - A written notification from a governmental agency that the Owner has violated a law or regulation that the agency has jurisdiction over. Notice will take the form used by the agency and may outline action to be taken by the Owner to correct the violation and may include a monetary fine.

A.55 *Small Tools* - Tools and equipment with an individual cost of less than \$1,000.

A.56 *Socially and Economically Disadvantaged Individual* - Same as defined in 15 U.S.C. 637; "Socially disadvantaged individuals are those who have been subjected to racial or ethnic prejudice or cultural bias because of their identity as a member of a group without regard to their individual qualities". "Economically disadvantaged individuals are those socially disadvantaged individuals whose ability to compete in the free enterprise system has been impaired due to diminished capital and credit opportunities as compared to others in the same business area who are not socially disadvantaged."

ARTICLE 2 - PRELIMINARY MATTERS

2.01 *Delivery of Performance and Payment Bonds; Evidence of Insurance*

SC-2.01.A Amend the first sentence of Paragraph 2.01.A by striking out the following words:

"(if the Contract requires Contractor to furnish such bonds)."

2.02 *Copies of Documents*

SC-2.02.A Delete the word "four" and insert "five" in its place in Paragraph 2.02.A.

2.03 *Before Starting Construction*

SC-2.03 Add the following paragraphs after subparagraph A:

“B. List of Employees. The Contractor shall be responsible for providing to the Owner, a complete list of employees who will be utilized in the project. This list shall include employees of both the Contractor and SubContractors. All employees will be required to maintain a picture ID at all times they are on the Project site. The Owner will have the right to request the photo ID of any personnel at the Project site at any time to confirm the identity of any individual and confirm that the individuals are on the approved employee list. Any individual found to be working on the site that is not listed on the approved employee list will be escorted from the project site.

C. Background Checks. The Contractor shall be responsible for providing a background check of each individual requiring access to the Project. The background check shall be completed by an agency or entity approved by the Owner. The Contractor shall provide the completed background check information to the Owner for review, at no cost to the Owner. The Owner reserves the right to approve or disapprove individual access to the Project site at the Owner’s sole discretion.”

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, REQUIREMENTS , REUSE

3.01 Intent

SC-3.01 Add the following new paragraphs immediately after Paragraph 3.01.G:

- H. The Contract Drawings may be supplemented from time to time with additional Drawings by the Engineer as may be required to illustrate the Work or, as the Work progresses, with additional Drawings, by the Contractor, subject to the approval of the Engineer. Supplementary Drawings, when issued by the Engineer or by the Contractor, after approval by the Engineer, shall be furnished in sufficient quantity to all those who, in the opinion of the Engineer, are affected by such Drawings.

ARTICLE 4 - COMMENCEMENT AND PROGRESS OF THE WORK

4.01 Commencement of Contract Times; Notice to Proceed

SC-4.01.A Delete Paragraph 4.01.A in its entirety and insert the following in its place:

The Contract Times will commence to run on the day indicated in the Notice to Proceed; but in no event will the Contract Time commence to run later than the thirtieth day after the effective date of the Agreement. By mutual consent of the parties to the Contract, these time limits may be changed.

4.05 Delays in Contractor’s Progress

SC-4.05.C Amend Paragraph 4.05.C by adding the following subparagraphs:

5. Weather-Related Delays

- a. If “abnormal weather conditions” as set forth in Paragraph 4.05.C.2 of the General Conditions are the basis for a request for an equitable adjustment in the Contract Times, such request must be documented by data substantiating each of the following: 1) that weather conditions were abnormal for the period of time in which the delay occurred, 2) that such weather conditions could not have been reasonably anticipated, and 3) that such weather conditions adversely affected an activity on the critical path to completion of the Work, as of the time of the weather condition.
- b. The existence of abnormal weather conditions will be determined on a month-by-month basis in accordance with the following.
 - 1) Bad Weather Day: a workday where weather conditions adversely affect the Work and the impacted Work is on the critical path.
 - a) Determination of actual Bad Weather Days during performance of the Work will be based on weather at the Site. When Site weather data is not available, use nearest USGS weather station data.
 - b) A workday after a daily rainfall amount greater than 1 inch will be considered an additional Bad Weather Day, subject to having an adverse effect on the Work as scheduled.
 - 2) Foreseeable Bad Weather Days: determination of Foreseeable Bad Weather Days during performance of the Work will be based on the weather records measured and recorded by the National Oceanic & Atmospheric Administration, National Centers for Environmental Information (NOAA-NCEI) at the nearest weather monitoring station. For example, one source of weather records is from the NOAA-NCEI website: <https://www.ncdc.noaa.gov/cdo-web/datatools/normals>. From the website, click on the “View Station Report” link to find the Summary of Monthly Totals report.
 - a) Contractor shall anticipate and factor into its bid and construction schedule the number of Foreseeable Bad Weather Days per month.
 - 3) Abnormal Weather Conditions: is defined as the total Bad Weather Days in each month minus the Foreseeable Bad Weather Days.
 - a) The existence of Abnormal Weather Conditions will not relieve Contractor of the obligation to demonstrate and document that delays caused by Abnormal Weather Conditions are specific to the planned work activities or that such activities thus delayed were on Contractor’s then-current Progress Schedule’s critical path for the Project.

SC-4.05 Add the following new paragraph immediately after Paragraph 4.05.G:

- H. Claims for additional Contract Time for delays beyond the Contractor's control shall be submitted within 30 days following the event(s) that caused the delay.

ARTICLE 5 - SITE; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

SC-5.06.B Delete Paragraph 5.06.B in its entirety and insert the following:

B. Not used.

SC-5.06.I In the first line, insert "North Carolina" between "by" and "Laws".

SC-5.06.I Add the following language at the end of Paragraph 5.06.I:

The parties understand and acknowledge that no North Carolina case, statute, or Constitutional provision authorizes a local government to indemnify a Contractor and that this contract provision may be unenforceable.

SC-5.06.J Delete Paragraph 5.06.J in its entirety and insert the following in its place:

- J. Contractor's indemnity, defense and hold harmless obligations to the Indemnified Parties under SC-7.18 shall apply as to any and all Losses, liabilities, damages, expenses and costs caused by, arising out of, resulting from, or in connection with the Contractor's or its Derivative Parties' failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or its Derivative Parties, or to a Hazardous Environmental Condition created by Contractor or its Derivate Parties when the Fault of the Contractor or its Derivative Parties is a proximate cause of the Losses, liabilities, damages, expenses and costs so indemnified. Provided, however, nothing herein shall require the Contractor to indemnify the Indemnified Parties against any such Losses, liabilities, damages, expenses and costs arising out of, resulting from, or in connection with any negligent acts of one or more of the Indemnified Parties.

ARTICLE 6 - BONDS AND INSURANCE

Article 6 Delete Article 6 in its entirety and insert the following in its place:

SC-6.01 *Performance and Payment Bonds*

- A. Concurrent with execution of the Contract and within fifteen (15) days of the Notice of Award, the successful Contractor shall procure, execute and deliver to the Owner and maintain, at Contractor's own cost and expense, the following bonds, in the forms included (Sections 00610 and 00615), of a surety company approved by the State of North Carolina as a Surety:
- B. Performance Bond - in an amount not less than 100% of the total amount payable to the Contractor by the terms of the Contract as security for the faithful performance of the Work. Bond must be valid until one year after the date of issuance of the certificate of Substantial Completion.

- C. Payment Bond - in an amount not less than 100% of the total amount payable to the Contractor by the terms of the Contract as security for the payment of all persons performing labor and furnishing material in connection with the Work. Bond must be valid until one (1) year after date of issuance of the certificate of Substantial Completion.
- D. All bonds signed by an agent must be accompanied by a certified copy of the authority to act.
- E. If the surety on any bond furnished by the Contractor is declared bankrupt or becomes insolvent or its right to do business in the State of North Carolina is revoked, the Contractor shall within five (5) days thereafter substitute another.

SC-6.02 *Insurance Requirements*

- A. The Owner shall not be required under this Contract to procure or maintain any insurance for the Project or for the benefit of the Project participants.
- B. The Contractor shall ensure that it and all its Subcontractors shall procure and maintain insurance as required herein and as required by Laws and Regulations.
- C. All insurance required by the Contract to be purchased and maintained by Contractor shall be obtained from insurance companies that are duly licensed or authorized to do business in the state of North Carolina and to issue insurance policies for the required limits and coverages. Unless a different standard is authorized by the Owner in writing, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- D. Alternative forms of insurance coverage, including but not limited to self-insurance and "Occupational Accident and Excess Employer's Indemnity Policies," are not sufficient to meet the insurance requirements of this Contract.
- E. Contractor shall deliver to Owner, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Contractor has obtained and is maintaining the policies and coverages required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, full disclosure of all relevant exclusions, and evidence of insurance required to be purchased and maintained by Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.
- F. Owner, only if specified in this agreement, shall deliver to Contractor, with copies to each additional insured identified in the Contract, certificates of insurance that Owner has obtained and is maintaining the policies and coverages required of Owner by the Contract (if any). None Required.
- G. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or

Contractor to identify a deficiency in compliance from the evidence provided, will not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.

- H. In addition to the liability insurance required to be provided by Contractor, the Owner, at Owner's sole option, may purchase and maintain Owner's own liability insurance. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.
- I. Contractor shall require:
 - 1. Subcontractors to purchase and maintain workers' compensation, commercial general liability and other insurance coverages required by Contractor where appropriate and applicable for their participation in the Project, and to name as additional insureds Owner and Engineer (and any other individuals or entities identified as additional insureds on Contractor's liability policies) on each Subcontractor's commercial general liability, automobile liability, and excess or umbrella insurance policy. Owner, Engineer and other additional insureds shall be covered under Subcontractors' commercial general liability and any umbrella insurance with respect to liabilities arising out of both ongoing and completed operations of Subcontractor(s). Such additional insured coverage shall be subject to the terms of ISO additional insured endorsement forms CG 20 10 (ongoing operations) and CG 20 37 (products-completed operations), or substitute form(s) providing equivalent coverage and utilizing 10/01 as the edition date of the ISO endorsements; and
 - 2. Suppliers to purchase and maintain insurance that is appropriate for their participation in the Project; and
 - 3. If the Scope of Work to be performed and/or the work site and surrounding area creates a special or high risk exposure to on-site individuals or the public, the Owner reserves the right to require the Contractor to ensure its Subcontractors, Suppliers, or categories of Subcontractor or Supplier, to provide specific insurance with policy limits as follows: **None**
- J. If either party does not purchase or maintain the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.
- K. If Contractor has failed to obtain and maintain required insurance, Contractor's entitlement to enter or remain at the Site will end immediately, and Owner may impose an appropriate set-off against payment for any associated costs (including but not limited to the cost of purchasing necessary insurance coverage), and exercise Owner's termination rights under Article 16.
- L. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are

adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary.

- M. The insurance and insurance limits required herein will not be deemed as a limitation on Contractor's liability, or that of its Subcontractors or Suppliers, under the indemnities granted to Owner and other individuals and entities in the Contract or otherwise.
- N. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, without at least 30 days prior written to Owner (10 days for cancellation due to non-payment of premium). Direct Notice of Cancellation endorsement is to be attached to corresponding certificates of insurance. In the event of any such cancellation, non-renewal or material limitation, the Contractor or subcontractor, as applicable, is obligated to replace such insurance within seven (7) days of any such cancellation, non-renewal or material limitation without a gap in coverage and file accordingly such notice with the Owner and other interested parties.
- O. The Work under this Contract shall not commence until the Contractor has verified to the Owner that all required insurance coverage as described herein, have been obtained and verifying Certificates of Insurance have been approved in writing by the Owner. The Owner's review and/or acceptance of certificates of insurance shall neither relieve Contractor of any requirement to provide the specific coverages set forth herein nor shall it constitute a waiver or acknowledgement of satisfaction of the specific insurance coverage requirements set forth in this Contract.
 - 1. The Description of Operations/Locations/Vehicles section in the certificates of insurance should include the City of Raleigh Department/Division, Name of Project or Services, Project Dates of contract.

The Certificate holder address should read:

City of Raleigh
Post Office Box 590
Raleigh, NC 27602-0590

SC-6.03 *Contractor's Insurance*

- A. *Required Insurance:* Contractor shall purchase and maintain Worker's Compensation, Commercial General Liability, Automobile Liability, Excess/Umbrella insurance and any other insurance specified within these Supplementary Conditions. Any and all deductibles and Self-insured Retentions (SIRs) in the insurance policies shall be assumed by, and at the sole risk of the Contractor.
- B. *Supplemental Provisions:* The policies of insurance required by this SC-6.03 as supplemented must:
 - 1. include at least the specific coverages required;
 - 2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;

3. remain in effect at least until the Work is complete (as set forth in Paragraph 15.06.D), and longer if expressly required elsewhere in this Contract, and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract;
 4. apply with respect to the performance of the Work, whether such performance is 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;
 5. be primary and noncontributory, evidenced by ISO form CG 20 01 04 13 (Primary and Non-Contributory – Other Insurance condition) endorsement or its equivalent, with respect to the Owner's insurance or self-insurance to the extent of the Contractor's liability hereunder. Any other insurance or self-insurance maintained by the Owner shall be excess of, and non-contributory with the coverage afforded by Contractor's commercial general liability insurance and commercial umbrella insurance, if any;
 6. provide for reinstatement of full coverage after payment of any claim;
 7. state insurers have no right of recovery or subrogation against the Owner, its agents and agencies and shall have no recourse against them for the payment of any premiums or assessments under any form of policy; and
 8. include all necessary endorsements to support the stated requirements.
- C. *Additional Insureds:* The Contractor's commercial general liability, automobile liability, employer's liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies must:
1. include and list as additional insureds Owner and Engineer, and any individuals or entities identified as additional insureds in this agreement;
 2. include coverage for the respective officers, directors, members, partners, employees, and consultants of all such additional insureds;
 3. afford primary and noncontributory coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations); and
 4. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Contractor's acts or omissions, or the acts and omissions of those working on Contractor's behalf, in the performance of Contractor's operations.
- D. *Other Additional Insureds:* If specified herein, the commercial general liability, automobile liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies must include as additional insureds (in addition to Owner and Engineer) the following: **None**

E. *Workers' Compensation and Employer's Liability*: Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.
2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).
3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).
4. Foreign voluntary worker compensation (if applicable).

Workers' Compensation and Related Policies	Policy limits of not less than:
Workers' Compensation	
North Carolina - State	Statutory
Employer's Liability	
Each accident	\$1,000,000
Each employee	\$1,000,000
Policy limit	\$1,000,000

F. *Commercial General Liability—Claims Covered*: Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against claims for:

1. damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees,
2. damages insured by reasonably available personal injury and advertising liability coverage, and
3. damages because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.

G. *Commercial General Liability—Form and Content*: Contractor's commercial liability policy must be written on an Insurance Services Organization, Inc. (ISO) commercial general liability form (occurrence form) and include the following coverages and endorsements:

1. Products and completed operations coverage.
 - a. Such insurance must be maintained for the period of the applicable statute of repose for any and all claims that may arise from operations of this Contract.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in herein or elsewhere in the Contract) certificates of insurance

evidencing continuation of such insurance at final payment and for the period of the applicable statute of limitations and repose.

2. Blanket contractual liability coverage, including but not limited to coverage of Contractor's contractual indemnity obligations in this Contract in accordance with ISO policy form CG 00 01.
 - a. Premises/Operations liability
 - b. Underground fault, explosion, and collapse coverage
 - c. Independent Contractor's and Independent Subcontractor's coverage
 - d. Broad form property damage
 - e. Personal injury and advertising coverage
 - f. Cross Liability/Severability of Interest clause
 - g. Employer's Stop Gap Liability endorsement, if applicable
 - i. Amendment of the Pollution Exclusion Endorsement to allow coverage for bodily injury or property damage caused by heat, smoke, or fumes from a hostile fire
 - j. Designated General Aggregate Limit Endorsement, if required in Contract
 - k. Products completed operations including construction defect and contractual liability
 - l. Insurance coverage limits to be on a "per project" basis
 3. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together). If Contractor demonstrates to Owner that the specified ISO endorsements are not commercially available, then Contractor may satisfy this requirement by providing equivalent endorsements.
 4. For design professional additional insureds, ISO Endorsement CG 20 32 07 13 "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.
- H. *Commercial General Liability—Excluded Content:* The commercial general liability insurance policy, including its coverages, endorsements, and incorporated provisions, must not include any of the following:
1. Any modification of the standard definition of "insured contract" (except to delete the railroad protective liability exclusion if Contractor is required to indemnify a railroad or others with respect to Work within 50 feet of railroad property).
 2. Any exclusion for water intrusion or water damage.

3. Any provisions resulting in the erosion of insurance limits by defense costs other than those already incorporated in ISO form CG 00 01.
4. Any exclusion of coverage relating to earth subsidence or movement.
5. Any exclusion for the insured's vicarious liability, strict liability, or statutory liability (other than worker's compensation).
6. Any limitation or exclusion based on the nature of Contractor's Work.
7. Any professional liability exclusion broader in effect than the most recent edition of ISO form CG 22 79.

I. *Commercial General Liability—Minimum Policy Limits*

Commercial General Liability	Policy limits of not less than:
General Aggregate	\$5,000,000
Products—Completed Operations Aggregate	\$5,000,000
Bodily Injury and Property Damage—Each Occurrence	\$2,000,000
Personal and Advertising Injury	\$2,000,000

- J. *Automobile Liability*: Contractor shall purchase and maintain automobile liability insurance 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 owned, hired or otherwise operated or used by or on behalf of the Contractor or any of its Derivative Parties and as used in the execution of the Work. The automobile liability policy must be written on an occurrence basis.

Automobile Liability	Policy limits of not less than:
Combined Single Limit	
Combined Single Limit (Bodily Injury and Property Damage) (Any/Owned, Hired, and Leased)	\$1,000,000

- K. *Umbrella or Excess Liability*: Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the Paragraphs above. The coverage afforded must be at least as broad as that of each and every one of the underlying policies using a follows form coverage for all layers and coverage shall remain continuously in effect and without interruption from the date of commencement of construction until the end of the applicable statute of limitations and repose.

Excess or Umbrella Liability	Policy limits of not less than:
Each Occurrence	\$2,000,000
General Aggregate	\$2,000,000

- L. *Using Umbrella or Excess Liability Insurance to Meet CGL and Other Policy Limit Requirements:* Contractor may meet the policy limits specified for employer's liability, commercial general liability, and automobile liability through the primary policies alone, or through combinations of the primary insurance policy's policy limits and limits of an umbrella or excess liability policy.
- M. *Contractor's Pollution Liability Insurance:* Contractor shall purchase and maintain a policy that must include Asbestos Legal Liability and Errors and Omissions due to potential environmental hazards.
1. Coverage shall apply to the scope of work described in this Contract including transportation and shall include coverage for bodily injury, property damage, including loss of use of damaged property, clean-up costs, mold, defense and investigative costs. Contractor shall maintain Completed Operations coverage for three (3) years following final acceptance of the project or termination of the Contract.
 2. If the insurance policy is written on a claims-made basis, Contractor warrants that continuous coverage will be maintained or an extended discovery period will be exercised for a period of three (3) following final acceptance of the Work under the Contract is completed or termination of the Contract..
 3. If coverage is canceled or non-renewed, and not replaced with another claims made policy form with a retroactive date prior to the Contract effective date or start of work date the Contractor must purchase an extended period coverage for a minimum of five (5) years following final acceptance of the Work or termination of the Contract.. A copy of the claims reporting requirements must be submitted to Owner for review. Pollution Liability shall not contain lead-based paint or asbestos exclusions.

This insurance must be maintained for no less than three years after final completion.

Contractor's Pollution Liability	Policy limits of not less than:
Each Occurrence/Claim	\$3,000,000
General Aggregate	\$3,000,000

- N. *Contractor's Professional Liability Insurance:* If Contractor will provide or furnish professional services under this *Contract*, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance to protect Owner from liability arising out of or resulting from the performance of professional services by Contractor or its Derivative Parties.
1. This insurance must cover negligent acts, errors, or omissions in the performance of professional design or related services by the insured or others for whom the insured is legally liable and shall contain full prior acts coverage.
 2. Coverage shall not include any exclusions or limitations related to a) Scope of professional services; b) Delays in project completion or cost overruns; c) Who is

authorized to notify the carrier of a claim or a potential claim; and d) Mold, fungus, asbestos, pollutants or hazardous substances.

3. The insurance must be maintained continuously throughout the duration of the Contract and through the applicable statute of limitations and repose.
4. Claims made coverage is permitted providing the retroactive date on the policy pre-dates the commencement of furnishing services on the Project.

Contractor's Professional Liability	Policy limits of not less than:
Each Claim	\$1,000,000
Annual Aggregate	\$3,000,000

P. *Unmanned Aerial Vehicle Liability Insurance:* If Contractor or its Subcontractors uses unmanned aerial vehicles (UAV—commonly *referred* to as drones) at the Site or in support of any aspect of the Work, Contractor shall obtain UAV liability insurance in the amounts stated; name Owner, Engineer, and all individuals and entities identified herein as additional insureds; and provide a certificate to Owner confirming Contractor's compliance with this requirement.

1. Such insurance will provide coverage for property damage, bodily injury or death, and invasion of privacy. The operator of the aircraft and their insurer(s) must hold the Owner and all additional insureds harmless and waive subrogation with respect to damage to the aircraft. If the aircraft is to be used to perform lifts at the Site, a "slung cargo" endorsement must be included to cover the full replacement value of any equipment being lifted.

Unmanned Aerial Vehicle Liability Insurance	Policy limits of not less than:
Each Claim	\$1,000,000
General Aggregate	\$1,000,000

Q. *Other Required Insurance:* **None**

SC-6.04 *Builder's Risk and Other Property Insurance*

- A. *Builder's Risk:* If applicable, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in this Section or required by Laws and Regulations) and name the Owner a Loss Payee on the insurance coverage(s).
- B. *Property Insurance for Facilities of Owner Where Work Will Occur:* Owner is responsible for obtaining and maintaining property insurance covering each Owner owned structure, building, or facility in which any part of the Work will occur, or to which any part of the Work will attach or be adjoined. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, providing coverage consistent with that required for the builder's risk insurance, and will be maintained until the Work is complete, as set forth in Paragraph 15.06.D.

- C. *Property Insurance for Substantially Complete Facilities:* Promptly after Substantial Completion, and before actual occupancy or use of the substantially completed Work, Owner will obtain property insurance for such substantially completed Work, and maintain such property insurance at least until the Work is complete, as set forth in Paragraph 15.06.D. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, and provide coverage consistent with that required for the builder's risk insurance. The builder's risk insurance may terminate upon written confirmation of Owner's procurement of such property insurance.
- D. *Partial Occupancy or Use by Owner:* If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide advance notice of such occupancy or use to the builder's risk insurer, and obtain an endorsement consenting to the continuation of coverage prior to commencing such partial occupancy or use.
- E. *Insurance of Other Property; Additional Insurance:* If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, then the entity or individual owning such property item will be responsible for insuring it. If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this SC-6.04, it may do so at Contractor's sole expense.
- F. *Builder's Risk Requirements:* The builder's risk insurance must:
1. be written on a builder's risk "all risk" policy form that at a minimum includes insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment stored and in transit, and must not exclude the coverage of the following risks:

Blasting and explosion, fire; windstorm; hail; flood; earthquake, volcanic activity, and other earth movement; lightning; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; collapse of or structural injury to any structure due to the Contractor's operations; damage to underground structures, pipes or conduits; debris removal; demolition occasioned by enforcement of Laws and Regulations; and water damage (other than that caused by flood).

 - a. The builder's all-risk coverage shall not contain an exclusion for resulting damage caused by faulty workmanship, design or materials.
 - b. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake, volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance will be provided through other insurance policies acceptable to Owner and Contractor.
 2. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation,

fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.

3. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of Contractors, Engineers, and Architects).
4. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).
5. extend to cover damage or loss to insured property while in transit.
6. allow for the waiver of the insurer's subrogation rights, as set forth in this Contract.
7. allow for partial occupancy or use by Owner by endorsement, and without cancellation or lapse of coverage.
8. include performance/hot testing and start-up, if applicable.
9. be maintained in effect until the Work is complete, or until written confirmation of Owner's procurement of property insurance following Substantial Completion, whichever occurs first.
10. include as named insureds the Owner, Contractor, Subcontractors (of every tier), all lenders with security interests in the Site or the Project, and any other individuals or entities required by this Contract to be insured under such builder's risk policy. For purposes of SC-6.04, SC-6.05, and SC-6.06 of this and all other corresponding Supplementary Conditions, the parties required to be insured will be referred to collectively as "insureds." In addition to Owner, Contractor, and Subcontractors of every tier, include as insureds the following:
 - a. **None**
11. if applicable, include, in addition to the Contract Price amount, the value of the following equipment and materials to be installed by the Contractor but furnished by the Owner or third parties:
 - a. **None**

G. Installation Floater

1. Not required.

- H. *Builder's Risk and Other Property Insurance Deductibles:* The purchaser of any required builder's risk, installation floater, or other property insurance will be responsible for costs not covered because of the application of a policy deductible.
1. The builder's risk policy (or if applicable the installation floater) will be subject to a deductible amount of no more than **\$10,000** for direct physical loss in any one occurrence.

SC-6.05 *Property Losses; Subrogation/Waiver of Rights*

- A. The builder's risk insurance policy purchased and maintained in accordance with SC-6.04 (or an installation floater policy if new construction is limited and authorized by the Owner), will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors.
1. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils, risks, or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused.
 2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Any property insurance policy maintained by Owner covering any loss, damage, or consequential loss to Owner's existing structures, buildings, or facilities in which any part of the Work will occur, or to which any part of the Work will attach or adjoin; to adjacent structures, buildings, or facilities of Owner; or to part or all of the completed or substantially completed Work, during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03 as modified by these Supplemental Conditions, or after final payment pursuant to Paragraph 15.06 as modified by these Supplemental Conditions, will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them, and that the insured is allowed to waive the insurer's rights of subrogation in a written contract executed prior to the loss, damage, or consequential loss.
1. 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 all losses and damages caused by,

arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.

- C. The waivers in this SC-6.05 include the waiver of rights 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 insured peril, risk, or cause of loss.
- D. Contractor shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

SC-6.06 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of property insurance required by SC-6.04 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after receipt of notice of such claim.
- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by SC-6.04 shall maintain such proceeds in a segregated account and distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, Contractor shall repair or replace the damaged Work, using allocated insurance proceeds.

ARTICLE 7 - CONTRACTOR'S RESPONSIBILITIES

7.02 *Supervision and Superintendence*

SC-7.02 Add the following new paragraph immediately after Paragraph 7.02.B:

- C. Contractor's On-Site Supervision: For pipeline Contractors who have more than two construction crews performing work under one contract, a general superintendent shall be assigned to the Project Site to supervise all construction crews on site. The general

superintendent shall be responsible for addressing any construction related issues from the Owner, the Engineer, and/or the Department of Transportation having jurisdiction.

7.03 *Labor; Working Hours*

SC-7.03 Add the following new paragraphs immediately after Paragraph 7.03.C:

- D. Regular Working Hours: 8:00 am to 5:00 pm, Eastern Standard Time.
- E. Overtime Work: If Contractor's Work requires inspection, as determined by the Owner, more than 10 hours in a work day or 40 hours in a work week, Monday through Friday excluding holidays, or on the weekends, Contractor shall submit a written request to the Owner five (5) working days prior to the scheduled Work. Contractor shall pay for the Resident Project Representative's time beyond the above hours at the rate of \$85/hour.
- F. Paragraph 7.03.C will not prevent the Contractor from working outside the regular working hours provided the work will not require the inspector to be present. Such work may include start up, clean up, seeding, painting (after the base surface has been approved by the inspector), and similar items. Contractor shall submit a written request to the Owner one (1) working day prior to the scheduled Work.
- G. Contractor shall not be charged for RPR's time for Work specifically identified by the Contract Documents to be performed outside the above Work time or on weekends.

7.05 *"Or Equals"*

SC-7.05 Add the following new paragraph immediately after Paragraph 7.05.E:

- F. Requirements for "or equals" shall be submitted prior to bidding. Reference Section 00100 (Advertisement for Bids) and Section 00200, Article 11 (Instructions to Bidders) for submission deadlines of requirements for "or equals".

7.07 *Concerning Subcontractors and Suppliers*

SC-7.07.C Add the following sentences to the end of Paragraph 7.07.C:

1. Bidder shall indicate subcontractors as required on the Bid Form.
2. Bidder shall indicate Minority Business Participation on the attachment to the Bid Forms. Low Bidder shall be required to submit the followings Affidavits as included in the City of Raleigh Business Assistance Program Guidelines:
 - a. Affidavit C, Portion of the Work to be Performed by Minority Firms.
 - b. Affidavit D, Good Faith Efforts
3. Contractor whose Bid is accepted shall not substitute any person as Subcontractor in the place of the Subcontractor listed in the Bid, except:

- a. If the listed Subcontractor's bid is later determined by the Contractor to be non-responsible or non-responsive, or the listed Subcontractor refuses to enter into a contract for the complete performance of the bid work;
- b. or with the approval of the City for good cause shown by the Contractor.

SC-7.07.K Delete Paragraph 7.07.K in its entirety and insert the following in its place:

- K. All work performed for Contractor by a Subcontractor shall be pursuant to an appropriate agreement between the Contractor and Subcontractor. The Subcontractor shall not commence work until the Contractor has obtained all insurance as required by Paragraphs 6.02 through 6.03 inclusive as amended by these Supplementary Conditions.

SC-7.07.N Add the following new paragraph immediately after Paragraph 7.07.M:

- N. Contractor shall not award work valued at more than fifty (50%) percent of the Contract Price to Subcontractor(s). Contractor shall perform at least fifty (50%) percent of the labor with own forces, unless prior written approval is provided by the Owner.

7.08 *Patent Fees and Royalties*

SC-7.08.B In the first line, insert "North Carolina" between "by" and "Laws".

SC-7.08.B Add the following language at the end of Paragraph 7.08.B:

The parties understand and acknowledge that no North Carolina case, statute, or Constitutional provision authorizes a local government to indemnify a Contractor and that this contract provision may be unenforceable.

SC-7.08.C Delete Paragraph 7.08.C in its entirety and insert the following in its place:

- C. Contractor's indemnity, defense and hold harmless obligations to the Indemnified Parties under SC-7.18 shall apply as to any and all Losses, liabilities, damages, expenses and costs caused by, arising out of, resulting from, or in connection with 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 when the Fault of the Contractor or its Derivative Parties is a proximate cause of the Losses, liabilities, damages, expenses and costs so indemnified. Provided, however, nothing herein shall require the Contractor to indemnify the Indemnified Parties against any such Losses, liabilities, damages, expenses and costs arising out of, resulting from, or in connection with any negligent acts of one or more of the Indemnified Parties.

7.09 *Permits*

SC-7.09.A Amend the last sentence of Paragraph 7.09.A to read as follows:

Contractor shall pay all charges of utility owners for connections for providing permanent service to the Work.

SC-7.09.B Add the following new paragraphs after Paragraph 7.09.A:

- B. Owner obtained encroachment agreements and permits are included as part of the Contract Documents. The encroachment agreements and permits are attached as an appendix to the specifications or project manual. This Paragraph does not relieve Contractor of responsibility to comply with applicable Laws and Regulations as stated in Paragraph 7.11.
- C. Contractor shall be responsible for compliance with the terms of the encroachment agreements and permits issued by Federal/State/Local regulatory agencies. Compliance with the terms listed in the encroachment agreements and permits shall be at no additional cost to the Owner. This shall include generating and submitting any reports that may be required as a condition of the encroachment agreements and permits. All costs shall be included in the bid prices of applicable items.

7.10 Taxes

SC-7.10 Add the following new paragraphs after Paragraph 7.10.A:

- B. Procedures for reporting sales tax are included in Section 00805.

7.11 Laws and Regulations

SC-7.11.B Delete Paragraph 7.11.B in its entirety and insert the following in its place:

- 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. If Contractor performs any Work knowing it to be contrary to such Laws or Regulations, and without such notice to Engineer, Contractor shall bear all costs arising therefrom. Contractor shall, at all times, observe and comply with and shall cause its Derivative Parties to observe and comply with all such existing Laws or Regulations. Further, Contractor's indemnity, defense and hold harmless obligations to the Indemnified Parties under SC-7.18 shall apply as to any and all Losses, liabilities, damages, expenses and costs caused by, arising out of, resulting from, or in connection with any claim, civil penalty, fine or liability arising from or based on the violation of any such Law or Regulations by the Contractor or its Derivative Parties.

SC-7.11 Add the following new paragraphs after Paragraph 7.11.C:

- D. Contractor shall be responsible for conforming to the requirements of the approved sedimentation control plan, the rules and regulations of the Erosion Control Laws of the State of North Carolina, specifically the Sedimentation Pollution Control Act of 1973 (G.S. 113A) as amended, and the local jurisdiction where the Project is located as it relates to land disturbing activities undertaken by Contractor. Contractor shall be responsible to Owner for any fines imposed on

Owner as a result of Contractor's failure to comply with the above as it is further described in the Erosion Control Section of the Specifications.

- E. Contractor shall be responsible for conforming to the requirements of the NC Department of Transportation Encroachment Agreement, if attached to the Contract Documents.
- F. Should the Contractor cause the Owner to receive a Notice of Violation from a governmental agency, Contractor shall pay costs associated with Notice of Violation within ten (10) days of receipt of written notification. Costs shall include, but not be limited to:
 - 1. Fines imposed on the Owner by the agency.
 - 2. Required legal newspaper publications concerning violation.
 - 3. Required mailings to customers concerning notification of violation.
 - 4. Administrative and engineering costs associated with resolving the Notice of Violation.
- G. Notice of Violation may include, but not be limited to, the following problems:
 - 1. Sewage spill.
 - 2. Inadequate erosion control measures.
 - 3. Equipment failure during the warranty period.
- H. In the event of a sewage spill during construction, Contractor shall take the following steps as a minimum:
 - 1. Take immediate action to contain the spill.
 - 2. Notify the Owner and Engineer within 30 minutes of realizing a spill has occurred.
 - 3. Clean up the spill as directed by the Owner. Contractor shall bear all costs associated with the cleanup.

7.12 *Record Documents*

SC-7.12 Add the following new paragraph after Paragraph 7.12.A:

- B. Record Documents shall be updated daily. Should the Owner or Engineer determine that the Record Documents are not being properly maintained, approval of future payment requests shall be withheld.

7.13 *Safety and Protection*

SC-7.13.A Add the following new subparagraph after Paragraph 7.13.A:

1. When tasks (operating valves, lock out – tag out, etc.) must be accomplished by City staff to allow Contractor to perform or continue its Work, Contractor shall independently verify and confirm the performance of the tasks prior to performing the impacted Work.

SC-7.13.D Delete Paragraph 7.13.D its entirety and insert the following in its place:

- D. Contractor shall be responsible for remedying damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.3 as follows:
 1. To the fullest extent allowed by Laws and Regulations, Contractor shall remedy at its own expense any and all damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.3 arising out of, or resulting from the sole negligence of the Contractor, the Contractor's agents, the Contractor's employees, 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.
 2. In matters other than those covered by subsection SC-7.18.A, and to the fullest extent allowed by Laws and Regulations, Contractor shall remedy at its own expense any and all damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.3 arising out of, resulting from, or in connection with the execution of the Work provided for in this Contract when the Fault of the Contractor or its Derivative Parties is a proximate cause of such damage, injury, or loss. For the purposes of this section, the terms "Fault" and "Derivative Parties" shall have the same meaning as that set forth in SC-7.18.E.

7.16 *Submittals*

SC-7.16D.2 In the first sentence, replace "two" with "three".

SC-7.16 Add the following new paragraph immediately after Paragraph 7.16.F:

- G. All materials or equipment delivered to the Site shall be accompanied by certificates, signed by an authorized officer of the supplier, and notarized guaranteeing that the materials or equipment conform to specification requirements. Such certificates shall be immediately turned over to the Engineer. Materials or equipment delivered to the Site without such certificates will be subject to rejection.

7.18 *Indemnification*

SC-7.18 Delete Paragraphs 7.18.A and 7.18.B in their entirety and insert the following in their place:

- A. To the fullest extent allowed by Laws and Regulations, Contractor shall indemnify, defend, and hold harmless the Owner, its officers, officials, employees, agents, or

indemnities (collectively called "Indemnified Parties") from and against those Losses, liabilities, damages, and costs proximately caused by, arising out of, or resulting from the sole negligence of the Contractor, the Contractor's agents, or the Contractor's employees.

- B. In matters other than those covered by subsection 7.18A, above, and to the fullest extent allowed by Laws and Regulations, Contractor shall indemnify, defend, and hold harmless the Indemnified Parties from and against those Losses, liabilities, damages, and costs caused by, arising out of, resulting from, or in connection with the execution of the Work provided for in this Contract when the Fault of the Contractor or its Derivative Parties is a proximate cause of the Loss, liability, damage, or expense indemnified.
- C. Costs and expenses shall include attorneys' fees, litigation or arbitration expenses, or court costs actually incurred by the Indemnified Parties to defend against third-party claims alleged in any court, tribunal, or alternative dispute resolution procedure required of any of the Indemnified Parties by Laws and Regulations or by contract, only if the Fault of the Contractor or its Derivative Parties is a proximate cause of the attorney's fees, litigation or arbitration expenses, or court costs to be indemnified.
- D. The Contractor's duty to indemnify, defend, and hold harmless described hereinabove shall survive the termination or expiration of this Contract.
- E. Definitions:
 - 1. For the purposes of SC-7.18, the term "Fault" shall mean any breach of contract; negligent, reckless, or intentional act or omission constituting a tort under applicable statutes or common law; or violation of applicable statutes or regulations.
 - 2. For the purposes of SC-7.18, the term "Loss" or "Losses" shall include, but not be limited to, fines, penalties, and/or judgments issued or levied by any local, state, or federal governmental entity.
 - 3. For the purposes of SC-7.18, the term "Derivative Parties" shall mean any of the Contractor's Subcontractors, agents, employees, or other persons or entities for which the Contractor may be liable or responsible as a result of any statutory, tort, or contractual duty.

ARTICLE 8 - OTHER WORK AT THE SITE

- 8.01 Not used.
- 8.02 Not used.
- 8.03 Not used.

ARTICLE 9 - OWNER'S RESPONSIBILITIES

9.11 *Evidence of Financial Arrangements*

SC-9.11 Add the following new paragraph immediately after Paragraph 9.11.A:

- B. On request of Contractor, prior to the execution of any Change Order involving a significant increase in the Contract Price, Owner shall furnish to Contractor reasonable evidence that adequate financial arrangements have been made by Owner to enable Owner to fulfill the increased financial obligations to be undertaken by Owner as a result of such Change Order.

ARTICLE 10 - ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

SC-10.01.A Delete Paragraph 10.01.A in its entirety and replace with the following:

- A. Engineer will be Owner's representative during the construction period and Engineer's instructions shall be followed promptly and efficiently.

10.03 *Resident Project Representative*

SC-10.03.A Add the following new subparagraphs immediately following Paragraph 10.03.A:

1. The Resident Project Representative (RPR) will serve as the Engineer's liaison with the Contractor, working principally through the Contractor's superintendent to assist the Contractor in understanding the intent of the Contract Documents.
2. The RPR shall conduct on-site observations of the Work in progress to confirm that the Work is proceeding in accordance with the Contract Documents. They will verify that tests, equipment and systems start-ups and operating and maintenance instructions are conducted as required by the Contract Documents. They will have the authority to disapprove or reject defective Work in accordance with Article 14.
3. The RPR will be Engineer's representative at the Site. RPR's dealings in matters pertaining to the Work in general will be with Engineer and Contractor. RPR's dealings with Subcontractors will only be through or with the full knowledge or approval of Contractor. The RPR will:
 - a. *Conferences and Meetings:* Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings (but not including Contractor's safety meetings), and as appropriate prepare and circulate copies of minutes thereof.
 - b. *Safety Compliance:* Comply with Site safety programs, as they apply to RPR, and if required to do so by such safety programs, receive safety

training specifically related to RPR's own personal safety while at the Site.

c. *Liaison*

- i) Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
- ii) Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
- iii) Assist in obtaining from Owner additional details or information, when required for Contractor's proper execution of the Work.

d. *Review of Work; Defective Work*

- i) Conduct on-Site observations of the Work to assist Engineer in determining, to the extent set forth in Paragraph 10.02, if the Work is in general proceeding in accordance with the Contract Documents.
- ii) Observe whether any Work in place appears to be defective.
- iii) Observe whether any Work in place should be uncovered for observation, or requires special testing, inspection or approval.

e. *Inspections and Tests*

- i) Observe Contractor-arranged inspections required by Laws and Regulations, including but not limited to those performed by public or other agencies having jurisdiction over the Work.
- ii) Accompany visiting inspectors representing public or other agencies having jurisdiction over the Work.

f. *Payment Requests: Review Applications for Payment with Contractor.*

g. *Completion*

- i) Participate in Engineer's visits regarding Substantial Completion.
- ii) Assist in the preparation of a punch list of items to be completed or corrected.
- iii) Participate in Engineer's visits to the Site in the company of Owner and Contractor regarding completion of the Work and assist in preparation of a final punch list of items to be completed or corrected by Contractor.

- iv) Observe whether items on the final punch list have been completed or corrected.
- 4. Except upon written instructions of the Engineer, the RPR or Owner's field staff shall not have authority to:
 - a. Authorize any deviation from the Contract Documents or approve any substitute materials or equipment (including "or-equal" items).
 - b. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
 - c. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.
 - d. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of construction.
 - e. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
 - f. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
 - g. Authorize Owner to occupy the Project in whole or in part.
 - h. 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.
 - i. Be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
 - j. 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.
- 5. Any decision made by RPR or Owner's field staff 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 RPR or Owner's field staff, will create, impose, or give rise to any duty in contract, tort, or otherwise owed by RPR or Owner's field staff to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

6. RPR's or Owner's field staff'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 Contractor under Paragraph 15.06.A, will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with, the Contract Documents.

SC-10.03.B Add the following new subparagraph immediately following Paragraph 10.03.B:

1. When the Owner assigns City field staff to monitor the project, such staff's limitations shall be as described in SC-10.03.A.4, SC-10.03.A.5 and SC-10.03.A.6.

ARTICLE 11 - CHANGES TO THE CONTRACT

11.07 *Change of Contract Price*

SC-11.07.B.2 Delete this subparagraph in its entirety and replace with the following:

2. Where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (with allowances for overhead and profit in accordance with Paragraph 11.07.C.2); or"

11.08 *Change of Contract Times*

SC-11.08 Add the following paragraph after Paragraph 11.08.B:

- C. Time Extension: Contract time extensions for weather delays do not entitle Contractor to "extended overhead" recovery.

ARTICLE 12 - CLAIMS

No Supplementary Conditions in this Article.

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

13.01 *Cost of the Work*

SC-13.01.B.1 Delete Paragraph 13.01.B.1 in its entirety and replace with the following:

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. Labor will be based on direct labor cost, Contractor to provide certified payroll upon request. No claims for extra cost shall be considered based on an escalation of labor costs throughout the period of the Contract.

SC-13.01.B.2 Add the following language at the end of the Paragraph:

No claims for extra cost shall be considered based on an escalation of material costs throughout the period of the Contract.

SC-13.01.B.3 Delete the second sentence "If required...be acceptable."

SC-13.01.B.4 Delete in its entirety.

SC-13.01.B.5.a Delete Paragraph in its entirety.

SC-13.01.B.5.c Delete Paragraph 13.01.B.5.c in its entirety and insert the following in its place:

c. Construction Equipment and Machinery:

1. Rentals of all construction equipment and machinery, and the parts thereof 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.
2. Full rental cost for rented, leased, and/or owned equipment shall not exceed rates listed in the current version of Rental Rate Blue Book for Construction Equipment (Blue Book). If rental rates for the equipment being used for the Work are not listed in the Blue Book, the Contractor will receive the prevailing rental rates being paid for such equipment in the area where the Project is located. Computed durations will be based upon the Work completed. Computed rates will include all operating costs; costs will include the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, shall cease to accrue when the use thereof is no longer necessary for the changed Work. Equipment or machinery with a value of less than \$1,000 will be considered small tools. The Engineer/Owner reserves the right to request four rental quotes as backup.
3. The hours of operation shall be based upon actual equipment usage to the nearest full hour, as recorded by the Engineer.

<u>Usage</u>	<u>Blue Book Payment Category</u>
Less than 8 hours	Hourly Rate
8 or more hours but less than 4 days	Daily Rate
4 or more days but less than 16 days	Weekly Rate
16 or more days	Monthly Rate

SC-13.01.B.5.d Add the following language at the end of the Paragraph:

However, reimbursable sales and use taxes paid to the State of North Carolina or to local governments in North Carolina shall be included or excluded from the Cost of the Work as described in Section 00805.

SC-13.01.B.5.f Delete Paragraph in its entirety.

SC-13.01.B.5.g Delete Paragraph in its entirety.

SC-13.01.B.5.h Delete Paragraph in its entirety.

SC-13.01.C.1 Add the following language at the end of the Paragraph.

Project Management will not be included in the Cost of the Work.

13.03 *Unit Price Work*

SC-13.03.E.1.a Delete Paragraph 13.03.E.1.a in its entirety and insert the following in its place:

- a. The extended Bid price of a particular item of Unit Price Work (excluding rock excavation and undercut) amounts to five (5) percent or more of the Contract Price (based on estimated quantities at the time of Contract formation) and the variation in the quantity of that particular item of Unit Price Work actually furnished or performed by Contractor differs by more than twenty-five (25) percent from the estimated quantity of such item indicated in the Agreement at the time of Contract formation; and

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

14.02 *Tests, Inspections, and Approvals*

SC-14.02.B Delete Paragraph 14.02.B in its entirety and insert the following in its place:

- B. Owner shall employ and pay for inspections and testing services specifically noted as such in the Contract. All others required shall be the responsibility of the Contractor.

SC-14.02.C Delete Paragraph 14.02.C in its entirety and insert the following in its place:

- C. If the Contract Documents, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any Work to be specifically inspected, tested, or approved by some public body, Contractor shall assume full responsibility therefore, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection, testing or approval.

SC-14.02.G Add the following paragraph(s) immediately following Paragraph 14.02.F:

- G. Owner reserves the right to independently perform at its own expense, laboratory tests on random samples of material or performance tests on equipment delivered to the Site. These tests if made will be conducted in accordance with the appropriate referenced standards or Specification requirements. The entire shipment represented by a given sample, samples or piece of equipment may be rejected on the basis of the failure of samples or pieces of equipment to meet specified test requirements. All rejected materials or equipment shall be removed from the Site, whether stored or installed in the Work, and the required replacement shall be made, all at no additional cost to the Owner.

14.03 *Defective Work*

SC-14.03.G Add a new paragraph after Paragraph 14.03.F:

- G. At any time during the progress of the Work and up to the date of final acceptance, the Engineer shall have the right to reject any Work which does not conform to the requirements of the Contract Documents, even though such Work has been previously inspected and paid for. Any omissions or failure on the part of the Engineer to disapprove or reject any Work or materials at the time of inspection shall not be construed as an acceptance of any defective Work or materials.

14.06 *Owner May Stop the Work*

SC-14.06.A Add the following language to the first sentence of Paragraph 14.06.A after:

".....will conform to the Contract Documents," add "or if the Work interferes with the operation of the existing facility", and then continue "then Owner may order..."

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

15.01 *Progress Payments*

SC-15.01.A Add the following paragraph immediately following Paragraph 15.01.A:

1. The Contractor shall submit for the Engineer's approval, a complete breakdown of all Lump Sum Items in the Bid. This breakdown, modified as directed by the Engineer, will be used as a basis for preparing estimates and establishing progress payments.

SC-15.01.B.4 Delete Subparagraph 15.01.B.4 in its entirety and replace with the following:

4. Progress payment request shall include the percentage of the total amount of the Contract which has been completed from the start-up of the Project to and including the last day of the preceding month, or other mutually agreed upon day of the month accompanied by such data and supporting evidence as Owner or Engineer may require.

SC-15.01.B. Add the following new subparagraphs after Subparagraph 15.01.B.4:

5. Forms shall be prepared by the Contractor and submitted to the Engineer for approval. Forms to be used are included in Section 00620 and will be supplied by the Engineer.
6. At the option of the Owner, partial payment up to the estimated value, less retainage, may be allowed for any materials and equipment not incorporated in the Work, pursuant to the following conditions:
 - a. Major equipment items stored off site shall be stored in a bonded warehouse and properly maintained during storage.
 - b. Equipment or materials stored on the Site shall be properly stored, protected and maintained.
 - c. For any partial payment the Contractor shall submit, with the monthly progress payment from each material or equipment manufacturer, bills or invoices indicating actual material cost.
 - d. Contractor shall submit evidence that payment has been made for materials or equipment stored and for which the Engineer has authorized partial payment and previous progress payments, prior to submission of the next monthly payment request.
7. The Owner will retain five percent (5%) of the amount of each such estimate until Work covered by the Contract is 50% complete. When 50% of the Work of the original Contract has been completed and in the opinion of the Owner the Contractor continues to perform satisfactorily and nonconforming Work identified in writing prior to that time by the Engineer or Owner has been corrected by the Contractor and accepted by the Owner, the Owner with written consent of surety will adjust future partial payments so that two and one-half percent (2-1/2%) of the original Contract Price is retained.
8. The Project shall be deemed 50% complete when the Contractor's gross project invoices, excluding the value of materials stored off-site, equals or exceeds 50% of the original value of the Contract, except the value of materials stored on-site shall not exceed 20% of the Contractor's gross invoices for the purpose of determining whether the project is 50% complete.
9. If the Owner determines it is appropriate to reduce retainage, the method used for such adjustment shall be to fix retainage at two and one-half percent (2-1/2%) of the original Contract amount (when the Work is 50% complete) and

to pay all subsequent Partial Payment Requests to the full approved amount. The intent of such an adjustment is to gradually reduce retainage to two and one-half percent (2-1/2%) of the original Contract amount when the Work is 100% complete. Following 50% completion of the Project, the Owner may also withhold additional retainage from any subsequent periodic payment, not to exceed five percent (5%), in order to allow the Owner to retain two and one-half percent (2-1/2%) total retainage through the completion of the Project.

10. If the Owner determines the Contractor's performance is unsatisfactory, the Owner may reinstate retainage for each subsequent periodic payment application up to a maximum amount of five (5) percent of the original Contract amount.
11. Within 60 days after the submission of a final pay application, the Owner with written consent of the surety shall release to the Contractor all retainage on payments held by the Owner if (1) the Owner receives a certificate of substantial completion from the Engineer, or (2) the Owner receives beneficial occupancy or use of the Project. However, the Owner may retain sufficient funds to secure completion of the Project or corrections on any Work. If the Owner retains funds, the amount retained shall not be more than 2.5 times the Engineer's estimated value of the Work to be completed or corrected. Any reduction in the amount of the retainage on payments shall be with the written consent of the Contractor's surety.
12. Retainer provisions contained in Contractor's subcontracts may not exceed the terms and conditions for retainage provided herein. Contractor is further required to satisfy the retainage provisions of N.C.G.S. 143-134.1(b2) with regard to subcontracts for early finishing trades (structural steel, piling, caisson, and demolition) and to coordinate the release of retainage for such trades from the retainage held by the Owner from the Contractor pursuant to statute.
13. Nothing shall prevent the Owner from withholding payment to the Contractor in addition to the amounts identified herein for unsatisfactory job progress, defective construction not remedied, disputed work, or third-party claims filed against the Owner or reasonable evidence that a third-party claim will be filed.

SC-15.01.C.6 Add the following new subparagraphs after Subparagraph 15.01.C.6.e:

- f. Sedimentation and erosion control are determined to be unsatisfactory or unacceptable. A deduction of up to 10% of the payment amount for bid items that include sedimentation and erosion control installed during the payment period may be withheld in order to ensure remediation of the unsatisfactory or unacceptable work. Upon remediation, Contractor may receive payment for the deduction in subsequent Application for Payment.
- g. Seeding and mulching are determined to be unsatisfactory or unacceptable. A deduction of up to 20% of the payment amount for bid items that include seeding and mulching installed during the payment period may be withheld in order to ensure remediation of the unsatisfactory or unacceptable work. Upon remediation,

Contractor may receive payment for the deduction in subsequent Application for Payment.

- h. Record Documents are not maintained satisfactorily and in accordance with the Contract Documents. Payment requests shall not be approved until the deficiencies are satisfactorily corrected.

SC-15.01.D.1 Delete Paragraph 15.01.D.1 in its entirety and insert the following in its place:

- 1. Upon receipt from Engineer of an Application for Payment bearing Engineer's recommendation of payment, Owner shall set off against the amount recommended by Engineer any sums to which Owner is entitled pursuant to Sec. 15.01.E of the General Conditions and shall then approve the Application for Payment. Owner shall tender the resulting balance due to Contractor within thirty (30) days of Owner's approval of the Application for Payment

15.03 *Substantial Completion*

SC-15.03 Add the following new subparagraph to Paragraph 15.03.B:

- 1. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, will be paid by Contractor to Owner. If Contractor does not pay, or the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under this Article 15.

15.06 *Final Payment*

SC-15.06.E Delete Paragraph 15.06.E in its entirety and insert the following in its place:

Final Payment Becomes Due: Upon receipt from Engineer of the final Application for Payment bearing Engineer's recommendation of payment, Engineer's notice of acceptability, and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled pursuant to Sec. 15.01.E of the General Conditions, and shall then approve the final Application for Payment. Owner shall tender the resulting balance due to Contractor within thirty (30) days of Owner's approval of the final Application for Payment.

ARTICLE 16 - SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

SC-16.01 Add the following new paragraph immediately after Paragraph 16.01A:

- B. Should the Owner suspend Work due to unsafe Work conducted by the Contractor, the Contractor shall not be allowed any adjustment in Contract Price or extension of Contract Time attributed to this delay.

16.02 *Owner May Terminate for Cause*

SC-16.02.A.3 Add the following after “jurisdiction”:

“(including those governing employee safety)”

SC-16.04.A Amend the first sentence of paragraph 16.04.A as follows:

Strike out the phrase “Owner fails for 30 days” and replace with “Owner fails for 45 days after Approval by Owner”.

SC-16.04.B Amend the first sentence of paragraph 16.04.B as follows:

Strike out the phrase “Owner has failed for 30 days” and replace with “Owner has failed for 45 days after Approval by Owner”.

ARTICLE 17 - FINAL RESOLUTION OF DISPUTES

SC-17.01.B Delete in its entirety and replace with the following:

- B. Either Owner or Contractor may request mediation of any claim submitted to Engineer for a decision under Article 12 - Claims before such decision becomes final and binding.

SC-17.01 Add the following new paragraphs after SC-17.01.B:

- C. In accordance with GS 143-128(f), any claim, dispute or other matter in question (involving greater than \$15,000) arising out of or related to this Agreement shall be subject to mediation as a condition precedent to the institution of legal or equitable proceeding by either party. The dispute resolution process adopted by the N.C. State Building Commission shall be followed. The process entitled “Rules Implementing Mediated Settlement Conferences in North Carolina Construction Projects” are included in Section 00810.
- D. All matters relating to this Contract shall be governed by the laws of the State of North Carolina, without regard to its choice of law provisions, and venue for any action relating to this Contract shall be Wake County Civil Superior Court or the United States District Court for the Eastern District of North Carolina, Western Division.

ARTICLE 18 - MISCELLANEOUS

18.01 *Giving Notice*

SC-18.01.A.3 Delete in its entirety and replace with the following:

3. by e-mail to the recipient, with the words "Formal Notice" in the e-mail's subject line.

SC-18.01 Add the following new paragraph after Paragraph 18.01.A:

- B. No oral statement of any person whomsoever shall in any manner or degree modify or otherwise affect the terms of this Contract. Any notice by a party to this Contract to another party or parties to this Contract relative to any part of this Contract shall be in writing.

18.07 *Controlling Law*

SC-18.07.A Delete in its entirety and replace with the following:

- A. All matters relating to this Contract shall be governed by the laws of the State of North Carolina, without regard to its choice of law provisions, and venue for any action relating to this Contract shall be Wake County Civil Superior Court or the United States District Court for the Eastern District of North Carolina, Western Division.

END OF SECTION

This page intentionally left blank.

**PROCEDURE FOR REPORTING NORTH CAROLINA SALES TAX
EXPENDITURES ON CITY OF RALEIGH CONTRACTS**
(for projects with reimbursable sales tax excluded from Bid)

1. The following procedure in handling the North Carolina Sales Tax is applicable to this project. Contractors shall comply fully with the requirements outlined hereinafter, in order that the owner may recover the amount of the tax permitted under the law. For the purposes of this section, "Sales Taxes" shall mean sales and use taxes paid to the State of North Carolina or to local governments in North Carolina.
 - (a) Reimbursable Sales Taxes are to be excluded from the bid price for this project.
 - (b) The City is entitled to refunds from the State of North Carolina for these reimbursable sales taxes. The Contractor that performs work under this contract is allowed to obtain a reimbursement from the City for those Sales Taxes for which the State will grant a refund to the City. The City will reimburse the Contractor, and the City later obtains a refund from the State.
 - (c) It shall be the general contractor's responsibility to furnish the City documentary evidence showing the materials used and sales tax paid by the general contractor and each of his subcontractors. Any county sales tax included in the contractor's statements must be shown separately from the state sales tax. If more than one county is shown, each county shall be listed separately.
 - (d) The documentary evidence shall be the attached Reimbursable Sales and Use Tax Statement. This evidence shall consist of a certified statement, by the general contractor and each of his subcontractors individually, showing total purchases of materials from each separate vendor and total sales taxes by each county paid each vendor. The certified statement must show the invoice number (s) covered and inclusive dates of such invoices. State sales tax shall be listed separately from county sales tax. If more than one county is shown, each county shall be listed separately. The invoices shall be provided to substantiate the information on the statement.
 - (e) Materials used from general contractor's or subcontractor's warehouse stock shall be shown in a certified statement at warehouse stock prices.
 - (f) The general contractor shall not be required to certify the subcontractor's statements. However, the subcontractor may submit for reimbursement by certifying a Reimbursable Sales and Use Tax Statement, submitting it to the general contractor for the general contractor to submit with the pay application for the properties listed on that form. The City will make the reimbursement payable to the Contractor.
 - (g) The documentary evidence to be furnished to owners eligible for Reimbursable Sales Tax refunds covers sales and/or use taxes paid on building materials used by general contractors and subcontractors in the performance of contracts with churches,

orphanages, hospitals not for profit, educational institutions not operated for profit and other charitable or religious institutions or organizations not operated for profit and incorporated cities, towns and counties in this State. The documentary evidence is to be submitted to the above-named institutions, organizations and governmental units to be included in claims for refunds to be prepared and submitted by them to obtain refunds provided by G.S. 105-164.14 and is to include the purchase of building materials, supplies, fixtures and equipment which become a part of or annexed to buildings or structures being erected, altered or repaired under contracts with such institutions, organizations or governmental units.

- (h) The Contractor may seek reimbursement separately from, but at the same time as, the application for payment is made for the properties that were taxed. The Contractor shall not file for reimbursement for Sales Taxes before the Contractor has the right to file an application for payment for the properties that were taxed.
- 2. If the State refuses to refund any such Sales Tax to the City, or if after a refund is made, the City is told to return a refund to the State, the Contractor shall upon demand repay the City for the amount of the failed refunds.
- 3. The contractor or contractors to whom an award is made on this project will be required to follow the procedure outlined above.
- 4. The contractor is advised that all requests for payment, partial or final, for work completed under this contract must include a sales tax report submitted in accordance with the procedures outlined above.

North Carolina Reimbursable Sales and Use Tax Statement

(Paid During This Estimate Period)

Project _____ Project Location _____ County _____ Estimate No. _____

Name of Contractor _____ Period Ending _____

Date	Vendor	Type of Property Purchased	Invoice Number	Invoice Amount	State Tax 5.5%	County Tax 2.25%	Total Tax 7.75%	County

The undersigned individual certifies (1) that he or she is an employee or principal of the Contractor that is filing this form with the City to request reimbursement for N.C. State and local sales and use taxes that the Contractor has paid, (2) that the above listed vendors were paid sales tax upon purchases of building materials during the period covered by the construction estimate, and the property upon which such taxes were paid with or will be used in the performance of this contract, (3) that no tax on purchases or rentals of tools and/or equipment is included in the above list, (4) that all of the material above became a part of or is annexed to the building or structure being erected, altered or repaired, and (5) that all of the information on this form, and any additional pages added to this page, if any, is true and accurate.

_____ County, North Carolina

Signed and sworn to (or affirmed) before this day by _____
(name of principal)

(signature of principal)

Date: _____
Notary Public's Signature

(Notary's printed or typed name, Notary Public)

(Official Seal)

My commission expires: _____

North Carolina Reimbursable Sales and Use Tax Statement by Subcontractor

(Paid During This Estimate Period)

Project _____ Project Location _____ County _____ Estimate No. _____

Name of Subcontractor _____ Period Ending _____

Date	Vendor	Type of Property Purchased	Invoice Number	Invoice Amount	State Tax 5.50%	County Tax 2.25%	Total Tax 7.75%	County

The undersigned individual certifies (1) that he or she is an employee or principal of the Subcontractor that is submitting this form with the Contractor so that the Contractor may request reimbursement for N.C. State and local sales and use taxes that the Subcontractor has paid, (2) that the above listed vendors were paid sales tax upon purchases of building materials during the period covered by the construction estimate, and the property upon which such taxes were paid with or will be used in the performance of this contract, (3) that no tax on purchases or rentals of tools and/or equipment is included in the above list, (4) that all of the material above became a part of or is annexed to the building or structure being erected, altered or repaired, and (5) that all of the information on this form, and any additional pages added to this page, if any, is true and accurate.

_____ County, North Carolina

Signed and sworn to (or affirmed) before this day by _____
(name of principal)

(signature of principal)

Date: _____

Notary Public's Signature

(Notary's printed or typed name, Notary Public)

(Official Seal) My commission expires: _____

This page intentionally left blank.

RULES IMPLEMENTING MEDIATED
SETTLEMENT CONFERENCES IN
NORTH CAROLINA PUBLIC CONSTRUCTION PROJECTS

Adopted
February 26, 2002

Table of Rules

Rule

1. Initiating Mediated Settlement Conferences
 - A. Purpose of Mandatory Settlement Conferences.
 - B. Initiating the Dispute Resolution Process.
2. Selection of Mediator
 - A. Selection of Certified Mediator by Agreement of the Parties.
 - B. Nomination and Court Approval of a Non-Certified Mediator.
 - C. Appointment of Mediator by the SCO.
 - D. Mediator Information Directory.
 - E. Disqualification of Mediator.
3. The Mediated Settlement Conference
 - A. Where Conference is to be Held.
 - B. When Conference is to be Held.
 - C. Request to Extend Deadline for Completion.
 - D. Recesses.
 - E. The Mediated Settlement Conference shall not be cause for the Delay of the Construction Project which is the focus of the Dispute.
4. Duties of Parties and Other Participants in Formal Dispute Resolution Process
 - A. Attendance.
 - B. Finalizing Agreement.
 - C. The Mediation Fee shall be paid in accordance with G.S. 143-128(g).
 - D. Failure to Compensate Mediator.
5. Authority and Duties of Mediators
 - A. Authority of Mediator.
 - B. Duties of Mediator.
6. Compensation of the Mediator
 - A. By Agreement.
 - B. By Appointment.
7. Mediator Certification
8. Rule Making
9. Definitions
10. Time Limits

RULE 1. INITIATING MEDIATED SETTLEMENT CONFERENCES

A. Purpose of Mandatory Settlement Conferences. Pursuant to G.S. 143-128(g) 143-135.26(11), these Rules are promulgated to implement a system of settlement events which are designated to focus the parties' attention on settlement rather than on claim preparation and to provide a structured opportunity for settlement negotiations to take place. Nothing herein is intended to limit or prevent the parties from engaging in settlement procedures voluntarily at any time prior to or during commencement of the dispute resolution process.

B. Initiating the Dispute Resolution Process

- 1) Any party to a public construction contract governed by Article 8. Ch. 143 of the General Statutes and identified in G.S. 143-128(g) and who is a party to a dispute arising out of the construction process in which the amount in controversy is at least \$15,000 may submit a written request to the public owner for mediation of the dispute.
- 2) Prior to submission of a written request for mediation to the public owner, the parties requesting mediation,
 - a) If a prime contractor, must have first submitted its claim to the Project Designer for review as set forth in Exhibit A. If the dispute is not resolved through the Project Designer's instructions, then the dispute becomes ripe for mediation in the Formal Dispute Resolution Process, and the party may submit his written request for mediation to the public owner.
 - b) If the party requesting mediation is a subcontractor, it must first have submitted its claim for mediation to the prime contractor with whom it has a contract. If the dispute is not resolved through the Prime Contractor's involvement, then the dispute becomes ripe for mediation in the Formal Dispute Resolution Process, and the party may submit its written request for mediation to the public owner.
 - c) If the party requesting mediation is the Project Designer, then it must first submit its claim to the public owner to resolve. If the dispute is not resolved with the public owner's involvement, then the Project Designers' dispute is ripe for mediation in the Formal Dispute Resolution Process, and the Project Designer may submit its written request to the public owner for mediation.

RULE 2. SELECTION OF MEDIATOR

A. Selection of Certified Mediator by Agreement of the Parties. The parties may select a mediator certified pursuant to the Rules by agreement within 21 days of requesting mediation. The requesting party shall file with the State Construction Office (hereinafter collectively referred to as the "SCO") or public owner if a non-State project a Notice of Selection of Mediator by Agreement within 10 days of the request; however, any party may file the notice. Such notice shall state the name, address and telephone number of the mediator selected; state the rate of compensation of the mediator; state that the mediator and opposing counsel have agreed upon the selection and rate of compensation; and state that the mediator is certified pursuant to these Rules.

- B. Nomination and Public Owner Approval of a Non-Certified Mediator.** The parties may select a mediator who does not meet the certification requirements of these rules but who, in the opinion of the parties and the SCO or public owner, is otherwise qualified by training or experience to mediate the action.

If the parties select a non-certified mediator, the requesting party shall file with the SCO a Nomination of Non-Certified Mediator within 10 days of the request. Such nomination shall state the name, address and telephone number of the mediator; state the training, experience or other qualifications of the mediator; state the rate of compensation of the mediator; and state that the mediator and opposing counsel have agreed upon the selection and rate of compensation.

The SCO or public owner shall rule on said nomination, shall approve or disapprove of the parties' nomination and shall notify the parties of its decision.

- C. Appointment of Mediator by the SCO.** If the parties cannot agree upon the selection of a mediator, the party or party's attorney shall so notify the SCO or public owner and request, on behalf of the parties, that the SCO or public owner appoint a mediator. The request for appointment must be filed within 10 days after request to mediate and shall state that the parties have had a full and frank discussion concerning the selection of a mediator and have been unable to agree. The request shall state whether any party prefers a certified attorney mediator, and if so, the SCO or public owner shall appoint a certified attorney mediator. If no preference is expressed, the SCO or public owner may appoint a certified attorney mediator or a certified non-attorney mediator.
- D. Mediator Information Directory.** To assist the parties in the selection of a mediator by agreement, the parties are free to utilize the list of certified mediators maintained in any county participating in the Superior Court Mediation Settlement Conference Program.
- E. Disqualification of Mediator.** Any party may request replacement of the mediator by the SCO or public owner for good cause. Nothing in this provision shall preclude mediators from disqualifying themselves.

RULE 3. THE MEDIATED SETTLEMENT CONFERENCE

- A. Where Conference is to be Held.** Unless all parties and the mediator otherwise agree, the mediated settlement conference shall be held in the county where the project is located. The mediator shall be responsible for reserving a place and making arrangements for the conference and for giving timely notice of the time and location of the conference to all attorneys, unrepresented parties and other persons and entities required to attend.
- B. When Conference is to be Held.** The deadline for completion of the mediation shall be not less than 30 days nor more than 60 days after the naming of the mediator.
- C. Request to Extend Deadline for Completion.** A party, or the mediator, may request the SCO or public owner to extend the deadline for completion of the conference. Such request shall state the reasons the extension is sought and

shall be served by the moving party upon the other parties and the mediator. If any party does not consent to the request, said party shall promptly communicate its objection to the SCO or public owner.

The SCO or public owner may grant the request by setting a new deadline for completion of the conference.

- D. **Recesses.** The mediator may recess the conference at any time and may set times for reconvening. If the time for reconvening is set before the conference is recessed, no further notification is required for persons present at the conference.

- E. **The mediated settlement conference shall not be cause for the delay of the construction project which is the focus of the dispute.**

RULE 4. DUTIES OF PARTIES AND OTHER PARTICIPANTS IN FORMAL DISPUTE RESOLUTION PROCESS

A. **Attendance.**

- 1) All parties to the dispute originally presented to the Designer or Prime Contractor for initial resolution must attend the mediation. Failure of a party to a construction contract to attend the mediation will result in the public owner's withholding of monthly payment to that party until such party attends the mediation.
- 2) Attendance shall constitute physical attendance, not by telephone or other electronic means. Any attendee on behalf of a party must have authority from that party to bind it to any agreement reached as a result of the mediation.
- 3) Attorneys on behalf of parties may attend the mediation but are not required to do so.
- 4) Sureties or insurance company representatives are not required to attend the mediation unless any monies paid or to be paid as a result of any agreement reached as a result of mediation require their presence or acquiescence. If such agreement or presence is required, then authorized representatives of the surety or insurance company must attend the mediation.

- B. **Finalizing Agreement.** If an agreement is reached in the conference, parties to the agreement shall reduce its terms to writing and sign it along with their counsel.

- C. **The mediation fee shall be paid in accordance with G.S. 143-128(g).**

- D. **Failure to compensate mediator.** Any party's failure to compensate the mediators in accordance with G.S. 143-128(g) shall subject that party to a withholding of said amount of money from the party's monthly payment by the public owner.

Should the public owner fail to compensate the mediator, it shall hereby be subject to a civil cause of action from the mediator for the 1/3 portion of the mediator's total fee as required by G.S. 143-128(g).

RULE 5. AUTHORITY AND DUTIES OF MEDIATORS

A. Authority of Mediator.

- 1) *Control of Conference.* The mediator shall at all times be in control of the conference and the procedures to be followed.
- 2) *Private Consultation.* The mediator may communicate privately with any participant or counsel prior to and during the conference. The fact that private communications have occurred with a participant shall be disclosed to all other participants at the beginning of the conference.
- 3) *Scheduling the Conference.* The mediator shall make a good faith effort to schedule the conference at a time that is convenient with the participants, attorneys and mediator. In the absence of agreement, the mediator shall select the date for the conference.

B. Duties of Mediator.

- 1) The mediator shall define and describe the following at the beginning of the conference:
 - a) The process of mediation;
 - b) The difference between mediation and other forms of conflict resolution;
 - c) The costs of the mediated settlement conference;
 - d) That the mediated settlement conference is not a trial, the mediator is not a judge, and the parties retain their legal rights if they do not reach settlement;
 - e) The circumstances under which the mediator may meet and communicate privately with any of the parties or with any other person;
 - f) Whether and under what conditions communications with the mediator will be held in confidence during the conference;
 - g) The inadmissibility of conduct and statements as provided by G.S. 7A-38.1(1);
 - h) The duties and responsibilities of the mediator and the participants; and
 - i) That any agreement reached will be reached by mutual consent.
- 2) *Disclosure.* The mediator has a duty to be impartial and to advise all participants of any circumstance bearing on possible bias, prejudice or partiality.
- 3) *Declaring Impasse.* It is the duty of the mediator timely to determine that an impasse exists and that the conference should end.
- 4) *Reporting Results of Conference.* The mediator shall report to the SCO or public owner within 10 days of the conference whether or not an agreement was reached by the parties. If an agreement was reached, the report shall state the nature of said agreement. The mediator's report shall inform the SCO or public owner of the absence of any party known to the mediator to have been absent from the mediated settlement conference without permission. The SCO or public owner may require the mediator to provide statistical data for evaluation of the mediated settlement conference program.
- 5) *Scheduling and Holding the Conference.* It is the duty of the mediator to schedule the conference and conduct it prior to the deadline of completion set by the rules. Deadlines for completion of the conference shall be strictly observed by the mediator unless said time limit is changed by a written order of the SCO or public owner.

RULE 6. COMPENSATION OF THE MEDIATOR

- A. **By Agreement.** When the mediator is stipulated by the parties, compensation shall be as agreed upon between the parties and the mediator provided that the provision of G.S. 143-128(g) are observed.
- B. **By Appointment.** When the mediator is appointed by the SCO or public owner, the parties shall compensate the mediator for mediation services at the rate in accordance with the rate charged for Superior Court mediation. The parties shall also pay to the mediator a one-time per case administrative rate in accordance with the rate charged for Superior Court mediation, which is due upon appointment.

RULE 7. MEDIATOR CERTIFICATION.

All mediators certified in the Formal Dispute Resolution Program shall be properly certified in accordance with the rules certifying mediators in Superior Court in North Carolina. * When selecting mediators, the parties may designate a preference for mediators with a background in construction law or public construction contracting. Such requirements, while preferred, are not mandatory under these rules.

All mediators chosen must either demonstrate they are certified in accordance with the Rules Implementing Scheduled Mediated Settlement Conference in Superior Court or must gain the consent of the SCO or public owner to mediate any dispute in accordance with these rules.

* Except when otherwise allowed by the SCO or public owner upon the request of the parties to the mediation.

RULE 8. RULE MAKING

These Rules are subject to amendment by rule making by the State Building Commission.

These Rules are mandated for State projects when the contracting state entity has not otherwise adopted its own dispute resolution provision. These rules are optional for all other projects subject to Article 8, Ch. 143 of the General Statutes.

RULE 9. DEFINITIONS

When the phrase "SCO or public owner" is used in these rules, "SCO" shall apply to state projects, "public owner" shall apply to non-state public projects.

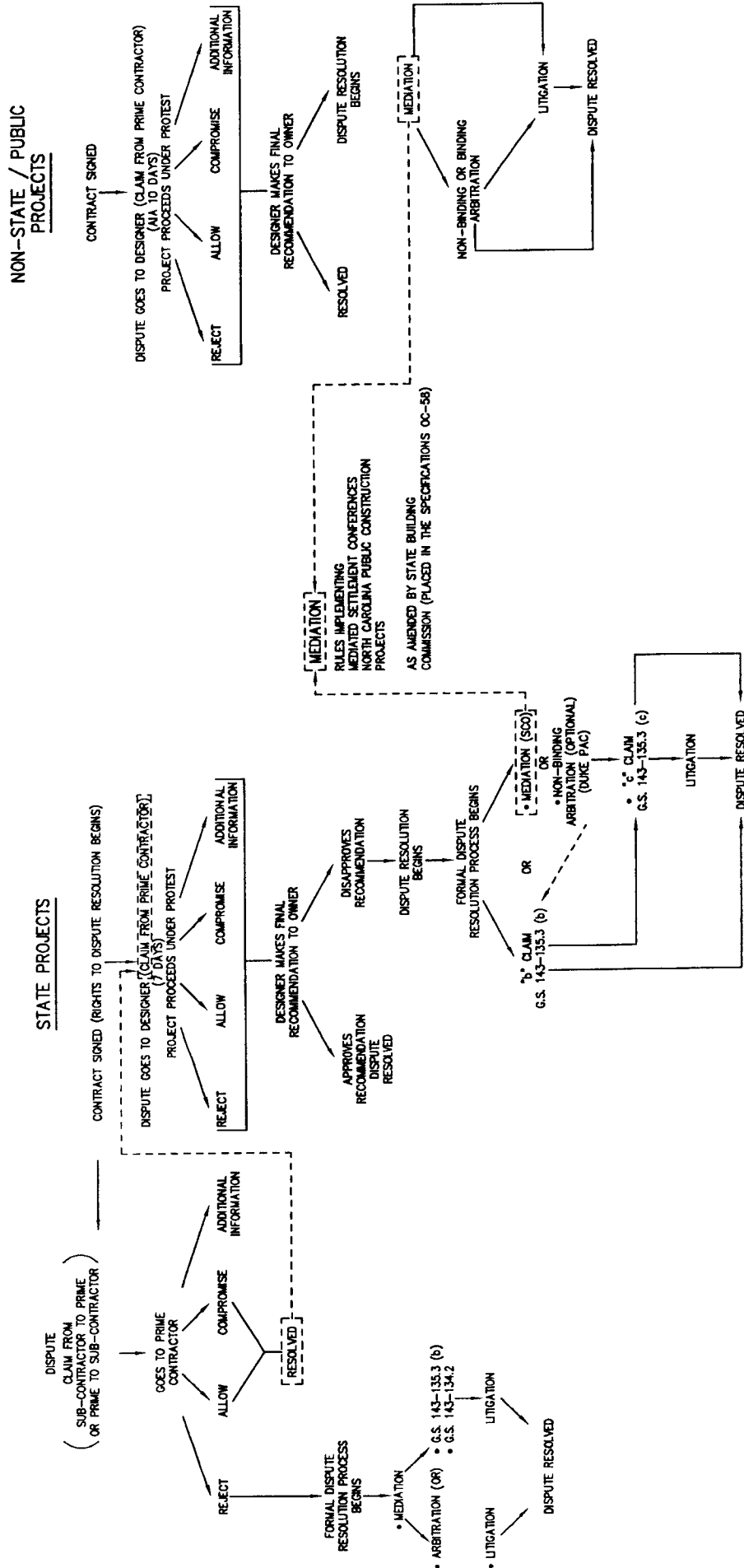
RULE 10. TIME LIMITS

On state contracts, any time limit provided for by these Rules may be waived or extended by the SCO for good cause shown.

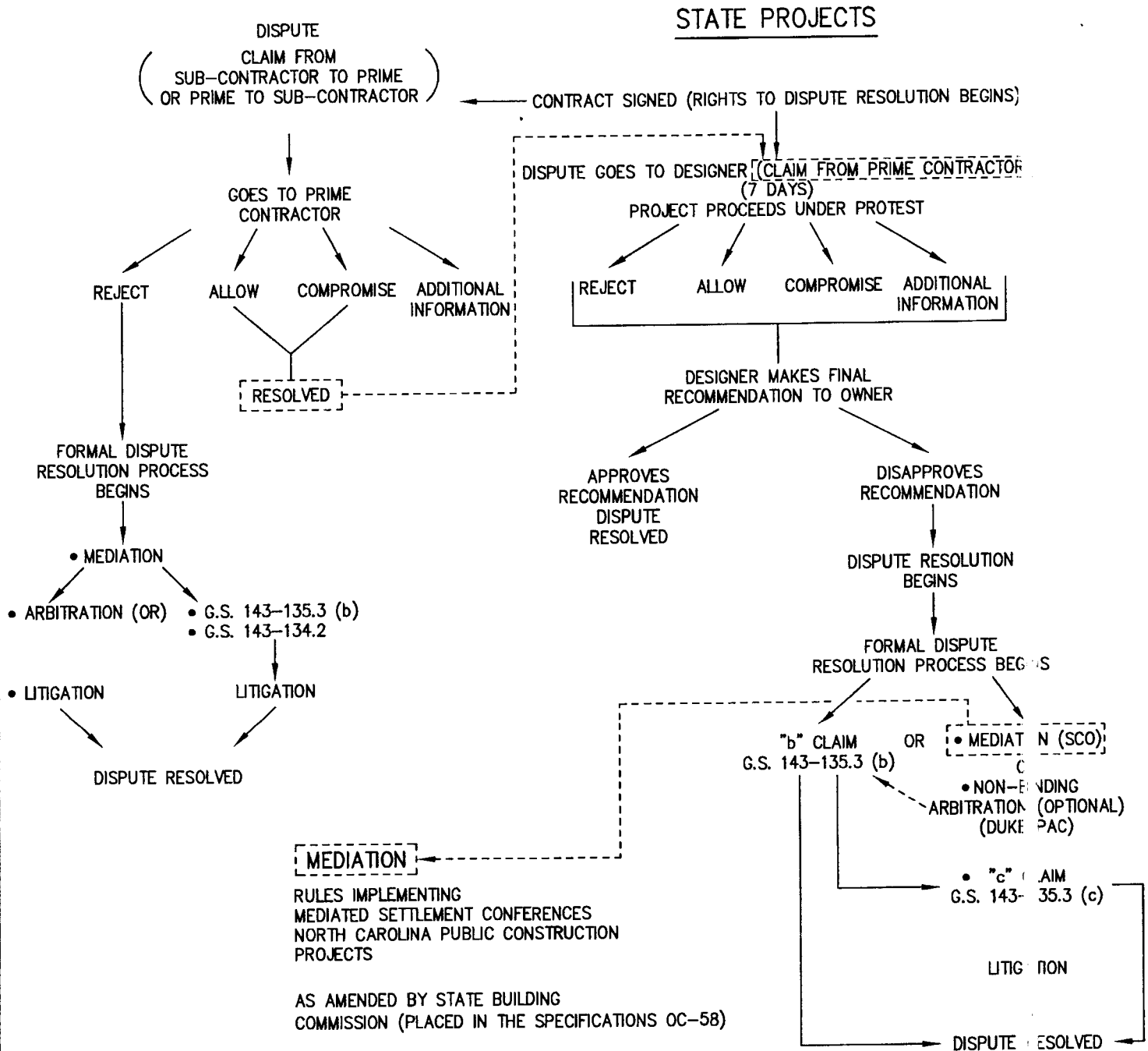
On non-state contracts, any time limit provided for by these Rules may be waived or extended by the mediator it appoints for good cause shown. If the mediator has not yet been appointed, the designer of record shall decide all waivers or extensions of time for good cause shown.

Exhibit A

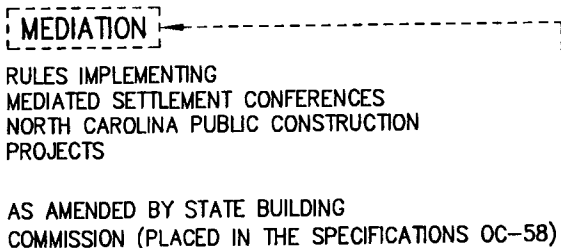
DISPUTE RESOLUTION



DISPUTE RESOLUTION



DISPUTE RESOLUTION



This page intentionally left blank.

WORK CHANGE DIRECTIVE NO.:

Owner: _____ Owner's Project No.: _____
Engineer: _____ Engineer's Project No.: _____
Contractor: _____ Contractor's Project No.: _____
Project: _____
Contract Name: _____
Date Issued: _____ Effective Date of Work Change Directive: _____

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

Description:

Attachments:

Purpose for the Work Change Directive:

Directive to proceed promptly with the Work described herein, prior to agreeing to change in Contract Price and Contract Time, is issued due to:

☐ Non-agreement on pricing of proposed change. ☐ Necessity to proceed for schedule or other reasons.

Estimated Change in Contract Price and Contract Times (non-binding, preliminary):

Contract Price: \$ _____ [increase] [decrease] [not yet estimated].

Contract Time: _____ days [increase] [decrease] [not yet estimated].

Basis of estimated change in Contract Price:

☐ Lump Sum ☐ Unit Price ☐ Cost of the Work ☐ Other

Recommended by Engineer

Authorized by Owner

By:

Title:

Date:

This page intentionally left blank.

CHANGE ORDER NO.:

Owner:

Engineer:

Contractor:

Project:

Contract Name:

Date Issued:

Owner's Project No.:

Engineer's Project No.:

Contractor's Project No.:

Effective Date of Change Order:

The Contract is modified as follows upon execution of this Change Order:

Description:

[Description of the change]

Attachments:

[List documents related to the change]

Change in Contract Price	Change in Contract Times
Original Contract Price: \$ _____	Original Contract Times: Substantial Completion: _____ Ready for final payment: _____
[Increase] [Decrease] from previously approved Change Orders No. 1 to No. [Number of previous Change Order] : \$ _____	[Increase] [Decrease] from previously approved Change Orders No.1 to No. [Number of previous Change Order] : Substantial Completion: _____ Ready for final payment: _____
Contract Price prior to this Change Order: \$ _____	Contract Times prior to this Change Order: Substantial Completion: _____ Ready for final payment: _____
[Increase] [Decrease] this Change Order: \$ _____	[Increase] [Decrease] this Change Order: Substantial Completion: _____ Ready for final payment: _____
Contract Price incorporating this Change Order: \$ _____	Contract Times with all approved Change Orders: Substantial Completion: _____ Ready for final payment: _____

Recommended by Engineer (if required)

Accepted by Contractor

By: _____

Title: _____

Date: _____

Authorized by Owner

Approved by Funding Agency (if applicable)

By: _____

Title: _____

Date: _____

Attachment 1 - Final Change Order:

The Owner and Contractor intend that this Final Change Order incorporate and resolve all prior, pending, and unresolved change order requests, claims, and/or disputes which have been submitted or which could have been submitted prior to the date of execution of this Final Change Order. This Final Change Order represents full and final settlement of all disputes or claims between the Parties to the Contract, and by executing this Final Change Order and in consideration of the modifications agreed to herein, Contractor expressly releases and waives all further claims for equitable adjustment; compensation in the form of money or time (days) for additional work, services, labor, or materials; damages for delay including but not limited to claims for additional overhead, lost productivity, ripple effect, cumulative impact, or acceleration; and any direct, indirect, or impacts costs including but not limited to any costs, losses, damages, charges, fees, expenses, interest, or attorneys' fees arising from or in connection with the Contract or this Final Change Order.

FIELD ORDER NO.:

Owner:

Owner's Project No.:

Engineer:

Engineer's Project No.:

Contractor:

Contractor's Project No.:

Project:

Contract Name:

Date Issued:

Effective Date of Field Order:

Contractor is hereby directed to promptly perform the Work described in this Field Order, issued in accordance with Paragraph 11.04 of the General Conditions, for minor changes in the Work without changes in Contract Price or Contract Times. If Contractor considers that a change in Contract Price or Contract Times is required, submit a Change Proposal before proceeding with this Work.

Reference:

Specification Section(s):

Drawing(s) / Details (s):

Description:

Attachments:

Issued by Engineer

By: _____

Title: _____

Date: _____

This page intentionally left blank.

RRD Wastewater Environmental Management System Memorandum of Understanding

The Raleigh Water Resource Recovery Division (RRD) is committed to managing our treatment plant activities in a responsible and publicly acceptable manner. We consider you, our contractor, to be a partner and an extension of our activities. This document is intended to summarize what contractors can expect from RRD in meeting our partnership commitment and the performance we expect our contractors to maintain so that we can meet those commitments. Many (if not all) of the items in this document are already in place and well established. This document is intended to clearly define for all observers and interested parties that RRD holds its contractors to the standards intended to promote continual improvement. All items are included in the scope of the current contract and should not be seen as additional tasks.

Furthermore, our Environmental Policy Statement guides us in the decisions we make:

The Resource Recovery Division recognizes the responsibility to protect the environment and public health focusing on products for beneficial reuse by:

- **Meeting or exceeding compliance obligations**
- **Seeking continual improvement**
- **Promoting positive relations with interested parties**
- **Protecting the environment, including prevention of pollution**

Raleigh Water RRD Responsibilities

As a fundamental principle in our commitment to our partnership with you, RRD understands and accepts our responsibilities to:

- Perform our activities consistent with the Wastewater Environmental Management System (WEMS), ISO 14001:2015 American National Standards, and any contracted agreements with you.
- Provide treatment that meets agreed quality, quantity and timing requirements.
- Advise you of any planned or actual changes or other circumstances that may affect your activities, with as much notice as reasonably possible.
- Review your performance from time to time and advise you of any concerns and/or improvement opportunities to help us both continually improve our partnership.
- Consider your advice and suggestions for improving our performance.
- Help you in meeting the Contractor Performance Expectations set out below.

Contractor Responsibilities

Consistent with our commitment to the Wastewater Environmental Management System and ISO 14001:2015 American National Standards we expect contractors who perform activities on our behalf to:

1. Have practices in place for compliance with all federal, state and local laws and requirements that apply to wastewater, reuse, and biosolids activities you do on our behalf. To meet this expectation, contractors should:
 - 1.1. Be aware of and take steps to ensure compliance with all applicable federal, state and local laws. Contractors can seek assistance from RRD in doing this.

- 1.2. Advise RRD of any noncompliance identified by regulatory agencies or others, including DOT, OSHA or EPA notices of violation, with plans to correct the noncompliance and prevent its recurrence.
2. Control operations and activities performed on behalf of RRD. To meet this expectation, contractors should:
 - 2.1. Maintain environmentally acceptable management practices and operations.
 - 2.2. Establish operational controls, including appropriate operating and maintenance procedures, for their activities performed on behalf of RRD.
 - 2.3. Follow RRD instructions for transporting, storing and using our biosolids or reuse, including but not limited to the transportation DOP developed by the RRD EMS team.
 - 2.4. Maintain good housekeeping practices in operations related to plant activities.
 - 2.5. Have a plan for emergencies involving plant equipment, reuse, and biosolids that has been reviewed and approved by RRD, which should include the jointly developed spill response plan.
 - 2.6. Ensure your personnel and/or subcontractors are competent on the basis of appropriate education, experience and/or training.
3. Communicate effectively with RRD and with interested parties about plant activities. To meet this expectation, contractors should:
 - 3.1. Have effective methods for communication with RRD and with interested citizens regarding plant activities.
 - 3.2. Communicate with users about the proper use of biosolids or reuse, including ensuring fact sheets and brochures are available.
 - 3.3. Refer requests or complaints from the public and interested parties about plant operations, reuse, or biosolids to RRD and advise us of any such requests/complaints.
 - 3.4. Meet regulatory reporting requirements.
 - 3.5. Communicate with RRD in a timely manner on any matter under your control that could affect our treatment plant, reuse, or biosolids programs.
4. Maintain pertinent documents and records. To meet this expectation, contractors should:
 - 4.1. Have copies of all permits and regulations that apply to your activities accessible.
 - 4.2. Develop and maintain appropriate documents that describe your activities to be performed on our behalf and requests for activities that you expect RRD to perform on your behalf.
 - 4.3. Maintain appropriate records to demonstrate work performed on our behalf.
5. RRD expects our contractors to work to continually improve their activities. To meet this expectation, contractors should:
 - 5.1. Seek continuous improvement in all aspects of work that the contractor performs.
 - 5.2. Allow designated RRD personnel to assess your performance on our behalf from time to time, including access to your site and records (audits).
 - 5.3. Develop corrective action plans with RRD to prevent the recurrence of any noncompliances or nonconformances identified by regulatory agencies or during RRD inspections.
 - 5.4. Meet with RRD periodically to discuss opportunities to improve our partnership and our respective activities. RRD will assist you in identifying improvement opportunities.



By signature below both RRD and the designated contractor indicate they understand the above performance expectations and agree to work together in performing activities for our mutual best interests.

Contractor Name / Address:

Signed By:

Contractor Representative

Date:

Raleigh Water RRD Representative

Date:

This page intentionally left blank.

SECTION 01 11 13 - WORK COVERED BY CONTRACT DOCUMENTS

PART 1 - GENERAL

1.1 GENERAL DESCRIPTION OF WORK

- A. The Work to be performed under these Contract Documents is generally described as follows:
 - 1. Demolition and in-kind replacement of MCC-P4B, MCC-P5B, and MCC-P6B.
 - 2. Demolition and replacement of PLC-81, PLC-82, and PLC-83 cabinets.
 - 3. New prefabricated metal enclosure with walls, roof, doors, lighting, and HVAC system to house new MCC and PLC.
 - 4. Extension of existing concrete foundation to accommodate new enclosure footprint.
 - 5. Demolition and replacement of all power wire cable within existing conduit from each MCC to each motor and device on BNR Aeration Basins 1-6.
 - 6. Demolition and replacement of sections of corroded electrical conduit from each MCC to each motor and device on BNR Aeration Basins 1-6.
- B. The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:
 - 1. Neuse River Resource Recovery Facility BNR Basins MCC Replacement

1.2 UNITS OF MEASUREMENT

- A. Both inch-pound (English) and SI (metric) units of measurement are specified herein; the values expressed in inch-pound units shall govern.

1.3 COORDINATION

- A. Contractor shall plan, schedule, and coordinate its operations in a manner which will facilitate the simultaneous progress of the work included under other contracts outside the scope of these Contract Documents.

1.4 WORK BY OWNER

- A. Owner shall perform certain activities in connection with the Project with its own personnel as follows:
 - 1. Operate all existing equipment, including gates, valves, and electrical components (cables, wires).

Work Covered by Contract Documents

2. Lock out/tag out existing electrical components, including circuit breakers and switches.
3. Coordinate and complete third-party testing, as required in the Contract Documents.

1.5 OFFSITE STORAGE

- A. Offsite storage arrangements shall be approved by Owner for all materials and equipment not incorporated into the Work but included in Applications for Payment. Such offsite storage arrangements shall be presented in writing and shall afford adequate and satisfactory security and protection. Offsite storage facilities shall be accessible to Owner and Engineer.

1.6 SUBSTITUTES AND "OR-EQUAL" ITEMS.

- A. Whenever a material or article is specified or described by using the name of a proprietary product or the name of a particular manufacturer or vendor, the specified item shall be understood as establishing the type, function, and quality desired. Requests for review of equivalency will not be accepted from anyone except Contractor, and such requests will not be considered until after the Contract has been awarded. Other manufacturers' products may be accepted, provided sufficient information is submitted to allow Engineer to determine that the products proposed are equivalent to those named. Such items shall be submitted for review by the procedure set forth in the Submittals Procedures section.
- B. Whenever the names of proprietary products or the names of particular manufacturers or vendors are used, it shall be understood that the words "or equal" following the enumeration, if not specifically stated, are implied.

1.7 PREPARATION FOR SHIPMENT

- A. All materials shall be suitably packaged to facilitate handling and protect against damage during transit and storage. Painted surfaces shall be protected against impact, abrasion, discoloration, and other damage. All painted surfaces which are damaged prior to acceptance of equipment shall be repainted to the satisfaction of Engineer.
- B. Each item, package, or bundle of material shall be tagged or marked as identified in the delivery schedule or on the Shop Drawings. Complete packing lists and bills of material shall be included with each shipment.

1.8 SALVAGE OF MATERIALS AND EQUIPMENT

- A. Existing materials and equipment removed and not reused as a part of the Work shall become Contractor's property, except items designated "Remove and Salvage" on the Drawings..
- B. Existing materials and equipment removed by Contractor shall not be reused in the Work.

1.9 LAND FOR CONSTRUCTION PURPOSES

- A. Contractor will be permitted to use available land belonging to Owner, on or near the Site, for construction purposes and for storage of materials and equipment.
- B. The locations and extent of the areas so used shall be as indicated on the Drawings .
- C. Contractor shall immediately move stored materials or equipment if any occasion arises, as determined by Owner, requiring access to the storage area. Materials or equipment shall not be placed on the property of Owner until Owner has agreed to the location to be used for storage.

1.10 EASEMENTS AND RIGHTS-OF-WAY

- A. The easements and rights-of-way for the pipelines will be provided by Owner. Contractor shall confine its construction operations within the limits indicated on the Drawings. Contractor shall use due care in placing construction tools, equipment, excavated materials, and pipeline materials and supplies in order to avoid damage to property and interference with traffic.
- B. On Private Property
 - 1. Easements across private property are indicated on the Drawings.
 - 2. Contractor shall set stakes to mark the boundaries of construction easements across private property.
 - 3. Contractor shall furnish, without charge, competent persons and such tools, stakes, and other materials as Engineer may require in staking out the boundaries of construction easements.
 - 4. Contractor will not be required to provide an instrument person.
 - 5. The stakes shall be protected and maintained until completion of construction and cleanup.
- C. Contractor shall not enter any private property outside the designated construction easement boundaries without written permission from the owner of the property.
- D. Work Within Highway and Railroad Rights-of-Way
 - 1. Permits shall be obtained by Owner.
 - 2. All Work performed and all operations of Contractor, its employees, or Subcontractors within the limits of railroad and highway rights-of-way shall be in conformity with the requirements and be under the control (through Owner) of the railroad or highway authority owning, or having jurisdiction over and control of, the right-of-way in each case.

1.11 OPERATION OF EXISTING FACILITIES

- A. The existing treatment plant must be kept in continuous operation throughout the construction period. No interruption will be permitted which adversely affects the degree of service provided. Provided permission is obtained from Owner in advance, portions of the existing facilities may be taken out of service for short periods corresponding with periods of minimum service demands.
- B. Contractor shall provide temporary facilities and make temporary modifications as necessary to keep the existing facilities in operation during the construction period. All temporary provisions shall be approved by Owner prior to installation.

1.12 NOTICES TO OWNERS AND AUTHORITIES

- A. Contractor shall notify owners of adjacent property and utilities when execution of the Work may affect them.
- B. When it is necessary to temporarily deny access to property, or when any utility service connection must be interrupted, Contractor shall give notices sufficiently in advance to enable the affected persons to provide for their needs. Notices shall conform to any applicable local ordinance and, whether delivered orally or in writing, shall include appropriate information concerning the interruption and instructions on how to limit inconvenience caused thereby.
- C. Utilities and other concerned agencies shall be notified at least 24 hours prior to cutting or closing streets or other traffic areas or excavating near underground utilities or pole lines.

1.13 LINES AND GRADES

- A. All Work shall be done to the lines, grades, and elevations indicated on the Drawings.
- B. Basic horizontal and vertical control points will be established or designated by Engineer to be used as datums for the Work. All additional survey, layout, and measurement work shall be performed by Contractor as a part of the Work.
- C. Contractor shall provide an experienced instrument person, competent assistants, and such instruments, tools, stakes, and other materials required to complete the survey, layout, and measurement work. In addition, Contractor shall furnish, without charge, competent persons and such tools, stakes, and other materials as Engineer may require in establishing or designating control points, in establishing construction easement boundaries, or in checking survey, layout, and measurement work performed by Contractor.
- D. Contractor shall keep Engineer informed, a reasonable time in advance, of the times and places at which it wishes to do Work, so that horizontal and vertical control points may be established and any checking deemed necessary by Engineer may be done with minimum inconvenience to Engineer and minimum delay to Contractor.
- E. Contractor shall remove and reconstruct work which is improperly located.

1.14 CONNECTIONS TO EXISTING FACILITIES

- A. Unless otherwise specified or indicated, Contractor shall make all necessary connections to existing facilities, including structures, drain lines, and utilities such as water, sewer, gas, telephone, and electric. In each case, Contractor shall receive permission from Owner or the owning utility prior to undertaking connections. Contractor shall protect facilities against deleterious substances and damage.
- B. Connections to existing facilities which are in service shall be thoroughly planned in advance, and all required equipment, materials, and labor shall be on hand at the time of undertaking the connections. Work shall proceed continuously (around the clock) if necessary to complete connections in the minimum time. Operation of valves or other appurtenances on existing utilities, when required, shall be by or under the direct supervision of the owning utility.

1.15 UNFAVORABLE CONSTRUCTION CONDITIONS

- A. During unfavorable weather, wet ground, or other unsuitable construction conditions, Contractor shall confine its operations to work which will not be affected adversely by such conditions. No portion of the Work shall be constructed under conditions which would affect adversely the quality or efficiency thereof, unless special means or precautions are taken by Contractor to perform the Work in a proper and satisfactory manner.

1.16 CUTTING AND PATCHING

- A. Contractor shall perform all cutting and patching required for the Work and as may be necessary in connection with uncovering Work for inspection or for the correction of defective Work.
- B. Contractor shall perform all cutting and patching required for and in connection with the Work, including but not limited to the following:
 - 1. Removal of improperly timed Work.
 - 2. Removal of samples of installed materials for testing.
 - 3. Alteration of existing facilities.
 - 4. Installation of new Work in existing facilities.
- C. Contractor shall provide all shoring, bracing, supports, and protective devices necessary to safeguard all Work and existing facilities during cutting and patching operations. Contractor shall not undertake any cutting or demolition which may affect the structural stability of the Work or existing facilities without Engineer's concurrence.
- D. Materials shall be cut and removed to the extent indicated on the Drawings or as required to complete the Work. Materials shall be removed in a careful manner, with no damage to adjacent facilities or materials. Materials which are not salvable shall be removed from the site by Contractor.

Work Covered by Contract Documents

- E. All Work and existing facilities affected by cutting operations shall be restored with new materials, or with salvaged materials acceptable to Engineer, to obtain a finished installation with the strength, appearance, and functional capacity required. If necessary, entire surfaces shall be patched and refinished.

1.17 HAZARDOUS ENVIRONMENTAL CONDITIONS AT SITE

- A. No Hazardous Environmental Conditions at the Site in areas that will be affected by the Work are known to the Owner.

1.18 CLEANING UP

- A. Contractor shall keep the premises free at all times from accumulations of waste materials and rubbish. Contractor shall provide adequate trash receptacles about the Site and shall promptly empty the containers when filled.
- B. Construction materials, such as concrete forms and scaffolding, shall be neatly stacked by Contractor when not in use. Contractor shall promptly remove splattered concrete, asphalt, oil, paint, corrosive liquids, and cleaning solutions from surfaces to prevent marring or other damage.
- C. Volatile wastes shall be properly stored in covered metal containers and removed daily.
- D. Wastes shall not be buried or burned on the Site or disposed of into storm drains, sanitary sewers, streams, or waterways. All wastes shall be removed from the Site and disposed of in a manner complying with local ordinances and antipollution laws.
- E. Adequate cleanup will be a condition for recommendation of progress payment applications.

1.19 APPLICABLE CODES

- A. References in the Contract Documents to local codes mean the following:
 - 1. North Carolina Building Code
 - 2. North Carolina Occupational Safety and Health Standards for General Industry
 - 3. National Fire Protection Association (NFPA)
 - 4. National Electrical Code (NFPA 70)
 - 5. National Electrical Safety Code (NESC)
 - 6. North Carolina Erosion and Sediment Control Requirements
- B. Other standard codes which apply to the Work are designated in the Specifications.

1.20 PRECONSTRUCTION CONFERENCE

- A. Prior to the commencement of Work at the Site, a preconstruction conference will be held at a mutually agreed time and place. The conference shall be attended by:
1. Contractor and its superintendent.
 2. Principal Subcontractors.
 3. Representatives of principal Suppliers and manufacturers as appropriate.
 4. Engineer and its Resident Project Representative.
 5. Representatives of Owner.
 6. Government representatives as appropriate.
 7. Others as requested by Contractor, Owner, or Engineer .
- B. Unless previously submitted to Engineer, Contractor shall bring to the conference a preliminary schedule for each of the following:
1. Progress Schedule.
 2. Procurement schedule.
 3. Schedule of Shop Drawings and other submittals.
- C. The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The agenda will include:
1. Contractor's preliminary schedules.
 2. Transmittal, review, and distribution of Contractor's submittals.
 3. Processing Applications for Payment.
 4. Maintaining record documents.
 5. Critical Work sequencing.
 6. Field decisions and Change Orders.
 7. Use of premises, office and storage areas, security, housekeeping, and Owner's needs.
 8. Major equipment deliveries and priorities.
 9. Contractor's assignments for safety and first aid.
- D. Engineer will preside at the conference and will arrange for keeping the minutes and distributing the minutes to all persons in attendance.

Work Covered by Contract Documents

1.21 PROGRESS MEETINGS

- A. Contractor shall schedule and hold regular progress meetings at least monthly and at other times as requested by Owner or required by progress of the Work. Contractor, and all Subcontractors active on the Site shall be represented at each meeting. Contractor may at its discretion request attendance by representatives of its Suppliers, manufacturers, and other Subcontractors.
- B. Contractor shall preside at the meetings. Meeting minutes shall be prepared and distributed by Contractor Engineer. The purpose of the meetings will be to review the progress of the Work, maintain coordination of efforts, discuss changes in scheduling, and resolve other problems which may develop.

1.22 RECORD DRAWINGS

- A. Contractor shall maintain at the site one record copy of all Drawings in good order and annotated to show changes made during construction. Contractor shall meet monthly with the Owner to review the record drawings and verify they correctly reflect all changes made during the month.

1.23 SITE ADMINISTRATION

- A. Contractor shall be responsible for all areas of the Site used by it and by all Subcontractors in the performance of the Work. Contractor shall exert full control over the actions of all employees and other persons with respect to the use and preservation of property and existing facilities, except such controls as may be specifically reserved to Owner or others.
- B. Contractor shall have the right to exclude from the Site all persons who have no purpose related to the Work or its inspection, and may require all persons on the Site (except Owner's employees) to observe the same regulations as Contractor requires of its employees. Contractor will not be permitted to work on City of Raleigh holidays or weekends unless prior approval is provided by the Owner. At which time Contractor shall provide a list of all Contractor's staff and subcontractors' staff that will be onsite. Any person(s) not listed will not be permitted on the site.

1.24 NONSMOKING BUILDING

- A. Contractor's personnel shall not smoke within the facility premises. This requirement shall be enforced from the beginning of construction of the super structure.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

End of Section

SECTION 01 12 16 - MAINTENANCE OF PLANT OPERATIONS

PART 1 - GENERAL

1.1 DESCRIPTION.

- A. The intent of this section is to outline the minimum requirements necessary to allow the Owner to continuously operate and maintain the treatment plant and remain in compliance with all permit requirements.
- B. Except for the shutdown durations specified in this section, the Contractor's means and methods shall be implemented such that the treatment plant shall remain in continuous satisfactory operation during the entire construction period. Work shall be scheduled and conducted by the Contractor such that it shall not impede any necessary operation, create potential hazards to operating equipment and plant personnel, or cause odor or other nuisances. In performing the Work shown and specified, the Contractor shall plan and schedule the Work to meet both the constraints outlined in this section and Owner's operating requirements.
- C. Work not specifically covered on the Drawings or in the following paragraphs may, in general, be done at any time during the Contract period, subject to the operating requirements outlined in this section.
- D. All references to days in this section are consecutive calendar days.
- E. The Contractor has the option of providing additional temporary facilities that can eliminate a constraint provided it is done without additional cost to the Owner and provided that all requirements of these Specifications are fulfilled.
- F. The Contractor shall be responsible for coordinating all shutdowns with the Owner. The Contractor shall, whenever possible, combine discrete shutdown procedures identified in this section or by the Contractor into a single shutdown when the duration of the shutdowns or the Work requirements allow such combining to occur on a unit process or work area. The intent of combining procedures is to minimize the impacts upon operations and processes by limiting the number of shutdowns required. The Contractor shall not shut down or disconnect any operating system of the plant, unless approved by the Owner, in writing. All plant equipment operations and shutdowns shall be executed by the Owner, unless otherwise noted. Contractor shall lock out and seal Owner operated gates and valves to prevent unnecessary leakage.
- G. This section of the Specifications may contain references to equipment, piping, material and appurtenances to be removed or reinstalled. Contractor shall also refer to the Demolition section and Drawings, for definition of the equipment, piping, material, and appurtenances to be removed, turned over to the Owner and removed from the site, or to become the property of the Contractor and removed from the site.
- H. The Contractor shall be responsible for supplying all temporary pipelines, valves, pumps, meters, spare parts, power, control panels, instrumentation, and any other appurtenances required for the installation and operation of temporary bypass lines, pumping systems, or conveyance systems required to maintain operations of the plant during construction activities.

Maintenance of Plant Operations

Where temporary systems are provided, Contractor shall provide a reasonable number of spares to replace protective devices (e.g., fuses) such that the duration of unplanned outages is minimized. All temporary pumps shall be provided with magnetic flowmeters capable of providing a 4-20 mA output signal. The Contractor shall design all temporary lines, pumping, or conveyance systems. Contractor shall inspect all temporary piping installed at regular time intervals, but no less than once a day, to ensure there are no leaks. Contractor shall maintain an inspection log documenting all inspections.

- I. The Owner shall have the authority to order Work stopped or prohibited that would, in Owner's opinion, unreasonably result in interrupting the necessary functions of the plant operations.
- J. If the Contractor impairs the performance or operation of the facility as a result of not complying with specified provisions for maintaining plant operations, then Contractor shall immediately make all repairs or replacements and do all work necessary to restore the plant operation to the satisfaction of the Owner. Such work shall progress continuously on a 24 hours per day, seven work days per week basis.

1.2 GENERAL CONSTRAINTS.

- A. Access to Site. An unobstructed traffic route through all gates shall be maintained at all times.
- B. Access Within the Plant Site. An unobstructed route around the plant site shall be maintained at all times for the Owner's personnel and maintenance equipment. Vehicular access to the treatment units and buildings for Owner's personnel shall be maintained at all times by the Contractor.
- C. Safety Barriers. The Contractor shall place safety barriers, in accordance with OSHA regulations, around areas under construction located around operational areas accessible to Owner's personnel.
- D. Personnel Access. Owner's Personnel shall have access to all areas which remain in operation throughout the construction period.
- E. Potable and Non-Potable Water Systems. The existing potable water and non-potable water (NPW) systems shall be kept in continuous operation at all times unless otherwise specified herein.
- F. Plumbing Facilities. Sanitary facilities in the existing structures shall be operational at all times for Owner's personnel, unless specified otherwise herein. All other building plumbing systems, such as roof and floor drains, pumping, etc., shall be maintained for all structures.
- G. Storm Drainage. Storm drainage on the site shall be operational at all times, unless otherwise specified herein.
- H. Building Heating and Ventilating. In the Contractor's Work areas and areas affected by the Contractor's operations, building heating and ventilating shall be provided and maintained. The temperatures to be maintained in interior pump station areas, whether new, existing or temporary, shall be a minimum of 50°F and not greater than 90°F.

Maintenance of Plant Operations

- I. Power, Lighting, and Communication Systems. Power, lighting, and communication systems shall be maintained in uninterrupted operation in all areas.
- J. Sump Pumps and Sumps. All existing sumps shall be maintained in an operable condition with either existing pumps or temporary pumps provided by the Contractor. Interim piping, power, and controls shall be provided by the Contractor, as required by the construction sequence.
- K. Draining Existing Pipes and Conduits. Contractor shall be responsible for dewatering all conduits and pipes as required to complete the Work at the beginning of each shutdown unless specified otherwise herein. Contractor shall remove all liquids and dispose of them at appropriate locations at the Site as directed by Owner. The liquid contents of all conduits and pipes undergoing modifications shall be transferred under the approval of Owner to existing in service conduits and pipes at the Site with sufficient capacity to accept such discharges, using temporary hoses, vacuum hoses, piping, pumps, or other means if hydraulic conditions require them. The Contractor shall provide the temporary pumps and piping. No uncontrolled spillage of a pipe, tank, or conduit shall be permitted. Any spillage, other than potable water, shall be immediately contained, cleaned up and properly disposed of in a manner acceptable to Owner and surrounding areas and structures shall be cleaned of residual spilled materials.
- L. Dead End Valves or Pipe. Contractor shall provide blind flanges on all valves or pipes which dead-end a line on a temporary or permanent basis. Blind flanges shall be braced and blocked, as required or as directed by the Engineer in the field.
- M. Underground Piping Tie-ins.
 - 1. Contractor shall carefully plan all tie-ins to existing underground piping to minimize impact to operation of existing facilities. Contractor shall provide a written plan for each tie-in at least 3 weeks prior to the tie-in date to Engineer for approval. All material and equipment required for such tie-ins shall be onsite and verified by Engineer prior to beginning the work. Contractor is responsible for verifying the location of existing piping, isolation locations, and ability to isolate the section of existing piping necessary for tie-in ahead of the tie-in and notifying the Engineer of any discrepancy that may require modification.
 - 2. During the tie-in, Contractor shall be responsible for draining the piping to allow for the tie-in to occur as well as filling once the tie-in is complete. Unless specified otherwise herein for a specific tie-in, Contractor will be allowed 4 hours to complete each individual tie-in. Work shall commence around the clock as may be necessary to complete the tie-in within the amount of time indicated. For underground piping that is being relocated Contractor shall have completed all piping between the two tie-in points including installation, backfilling, testing, and disinfection (PW only). Temporary plugs shall be provided at each end of the newly relocated lines to prevent disturbance of the piping until the time of the tie-in.
- N. Tie-ins to Existing Manholes.
 - 1. Contractor shall carefully plan all tie-ins to existing manholes to minimize impact to operation of existing facilities. Contractor shall provide a written plan to the Engineer for approval for each tie-in at least 3 weeks prior to the tie-in date including details of proposed temporary pipe plugs and bypass pumping. All material and equipment required for such tie-ins shall be onsite and verified by Engineer prior to beginning the work.

Contractor is responsible for notifying the Engineer if existing conditions will prevent the proposed tie-in as designed so that modifications may be made.

2. During the tie-in, Contractor shall take the affected manhole out-of-service by plugging the upstream line at the nearest upstream manhole and providing temporary bypass pumping. Unless specified otherwise herein for a specific tie-in, Contractor will be allowed 8 hours to complete each tie-in and work shall commence around the clock as necessary to complete the tie-in.

O. Shutdown and Start-up Scheduling.

1. The Contractor shall schedule all shutdowns during favorable weather conditions. The Contractor shall schedule all shutdowns and startups for Monday through Thursday. No shutdowns or startups will be allowed on Friday, Saturday, and Sunday.

1.3 SHUTDOWNS.

- A. A shutdown shall be defined as a portion of the normal operation of a functional unit that has to be suspended or taken out of service in order to perform the specified Work. For each shutdown, the Contractor shall compile an inventory of labor and materials required to perform tasks, an estimate of the time required, and a written description of steps required to complete all tasks. The inventory, the estimate, and written procedures shall be submitted to the Owner for review at least 15 calendar days prior to the proposed start date of the shutdown. The Contractor shall also request from the Owner, in writing, approval for each shutdown a minimum of 7 calendar days prior to the proposed shutdown date. Shutdowns may also be required to be scheduled during dry weather / low plant flow conditions to allow the plant electrical to be taken out of service and plant to process all flows with treatment processes, piping, and/or equipment out of service. Therefore, proposed shutdown dates shall also be subject to the weather conditions and/or time of the day for approval.
- B. The Contractor shall also have on hand and located in close proximity to the Work area all tools, equipment, spare parts, and materials, both temporary and permanent, necessary to complete each Work category without interruption. Adequate numbers of personnel shall be scheduled for each shutdown, so that the Work shall be accomplished within the specified time frame. Prefabrication of all piping and other assemblies shall be completed, to the greatest degree possible, prior to any shutdown. The Owner shall be satisfied that the Contractor has complied with these requirements, to the fullest extent possible, before shutdowns will be authorized.
- C. No shutdown shall be initiated until the inventory of materials and labor is verified by the Owner onsite at least one week prior to the proposed start date.
- D. If the Contractor's procedures cause an unscheduled shutdown of the facilities, the Contractor shall perform Work as necessary to immediately re-establish satisfactory operation. The Contractor shall notify the Owner, in writing, immediately of any unscheduled shutdown. The Contractor shall permit Owner's personnel to work with Contractor's personnel, as required, to maintain the facility in continuous satisfactory operation. Unscheduled shutdown and/or interruptions of continued safe and satisfactory operation of the facilities that result in fines levied by the U.S. Environmental Protection Agency, North Carolina Department of

Maintenance of Plant Operations

Environmental Quality, or the County Department of Health, and are a result of the Contractor's work will be the responsibility of the Contractor.

- E. For shutdowns of electrical systems, all components shall be actuated or operated only by the Owner. The Contractor shall lock out and tag circuit breakers and switches operated by the Owner and shall check cables and wires to be sure that they are de-energized to ground potential before Work begins. Upon completion of the Work, the Contractor shall remove the locks and tags and notify the Owner that the facilities are available for use. Contractor shall provide hasps as required for lock out by Owner in parallel to Contractor and subcontractors working under Contractor's direction.
- F. Shutdown of Control Systems. Shutdown of control systems providing automated control unit processes, equipment, and systems within the plant caused by de-energizing PLCs, RIOs, instrumentation, etc. shall be allowed subject to the requirements herein. During periods of shutdown, Contractor shall provide alternate control systems and/or labor as required to assist the Owner in maintenance of plant operations.

1.4 OVERTIME.

- A. All overtime Work by the Contractor necessary to conform to the requirements of this section and related sections shall be included in the Contractor's price.

1.5 SPECIFIC OPERATIONAL CONSTRAINTS.

- A. The Contractor shall schedule all Work so the plant and plant systems are maintained in continuous operation during the construction period except during approved shutdowns. Plant facility shutdowns will be allowed for completion of work only as specifically stated in this section.
- B. The following information relates to the sequence for construction operations that must be phased as part of the Work and shall be taken into consideration in preparing the proposed schedule of construction operations. Other sequences proposed by Contractor will be considered, but the overall requirements and intent of these specified sequences and constraints must be met. All applicable temporary work shall conform to the requirements of Article 590 of the National Electrical Code.
 - 1. Field Investigation. Prior to commencing any MCC shutdown or demolition work as shown on the Drawings, Contractor shall investigate all existing cable routing to each existing MCC and PLC and add tags confirming understanding of how all cable is to be reconnected to each new MCC and PLC to match the existing.
 - 2. MCC-PXB Demolition and Replacement. Only one aeration basin at a time can be taken out of service between November 1st and April 30th. Therefore, Contractor shall coordinate electrical modifications work as shown on the Drawings with plant staff and phase work accordingly. If two aeration basins are taken out of service during the same period, Contractor shall furnish and provide temporary power to one basin's mixing pumps, NRCY pumps, air control valves, and all instrumentation until permanent power can be restored. Contractor shall incur all costs associated with furnishing temporary power. Temporary power may be supplied from MCC-PXA. The maximum duration to

Maintenance of Plant Operations

complete the work associated with each MCC-PXB shall be as specified under Milestone 1 in Article 4.04.A of the Agreement.

3. PLC-8X Demolition and Replacement. Contractor shall coordinate with Owner to allow for local control of all equipment and instrumentation while each PLC is being demolished and replaced as shown on the Drawings. The maximum duration to complete the work associated with each PLC-8X shall be as specified under Milestone 2 in Article 4.04.A of the Agreement.
4. Pre-Fabricated Enclosure. At Contractor's option, the Pre-Fabricated Enclosure installation shall not be dependent upon delivery and installation of the new MCC, PLC or Marshalling Cabinet equipment. Anchorage for the enclosure shall be set to accommodate installation of new MCC, PLC, and Marshalling Cabinet either before or after enclosure has been installed.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

End of Section

SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 General

- A. Units of Measurement. When both inch-pound (English) and SI (metric) units of measurement are specified herein, the values expressed in inch-pound units shall govern.

1.2 SCHEDULE OF VALUES.

- A. After review of the preliminary schedule at the preconstruction conference, and before submission of the first Application for Payment, Contractor shall prepare and submit to Engineer a Schedule of Values covering each lump sum item. The Schedule of Values, showing the value of each kind of work, shall be acceptable to Engineer before any Application for Payment is prepared.
- B. The sum of the items listed in the Schedule of Values shall equal the Contract Price. Such items as Bond premium, temporary construction facilities, and plant may be listed separately in the Schedule of Values, provided the amounts can be substantiated. Overhead and profit shall not be listed as separate items.
- C. The Schedule of Values shall have sufficient detail such that partial completion of separable items of work can easily be calculated. The Schedule of Values shall have separate lines for manufacturer's field services, O&M manuals, and performance testing for each item of equipment requiring such services.
- D. An unbalanced Schedule of Values providing for overpayment of Contractor on items of Work which would be performed first will not be accepted. The Schedule of Values shall be revised and resubmitted until acceptable to Engineer. Final acceptance by Engineer shall indicate only consent to the Schedule of Values as a basis for preparation of applications for progress payments, and shall not constitute an agreement as to the value of each indicated item.

1.3 SCHEDULE OF PAYMENTS

- A. Within 30 days after award of contract, Contractor shall furnish to Engineer a schedule of estimated monthly payments. The schedule shall be revised and resubmitted each time an Application for Payment varies more than 10 percent from the estimated payment schedule.

1.4 SURVEY DATA.

- A. All field books, notes, and other data developed by Contractor in performing surveys required as part of the Work shall be available to Engineer for examination throughout

Construction Progress Documentation

the construction period. All such data shall be submitted to Engineer with the other documentation required for final acceptance of the Work.

1.5 LAYOUT DATA.

- A. Contractor shall keep neat and legible notes of measurements and calculations made in connection with the layout of the Work. Copies of such data shall be furnished to the Resident Project Representative for use in checking Contractor's layout as provided in the project requirements section. All such data considered of value to Owner will be transmitted to Owner by Engineer with other records upon completion of the Work.

End of Section

SECTION 01 32 16 - CONSTRUCTION PROGRESS SCHEDULE

PART 1 - GENERAL

1.1 GENERAL OVERVIEW.

- A. A Progress Schedule shall be used to control the Work and to provide a definitive basis for determining project progress. The Progress Schedule shall be prepared, maintained and updated by Contractor and historical dates agreed monthly with Engineer. Contractor shall submit a preliminary Progress Schedule and a Progress Schedule for acceptance by Engineer. These schedules shall be Contractor's working schedules and shall be used to plan, organize and execute the Work, record and report actual performance and progress, and show how Contractor plans to complete all remaining Work as of the end of each progress report period.
- B. The Progress Schedule shall comprise all the detailed construction-related activities using the critical path method (CPM). The Progress Schedule shall provide sufficient detail and clarity to reflect the intricacies and interdependencies of activities so Contractor can plan, schedule, monitor, control and report on the progress of his work. In addition, it shall provide Engineer and Owner a tool to monitor and follow the progress for all phases of the Work.

1.2 PRELIMINARY PROGRESS SCHEDULE.

- A. Following the pre-construction scheduling conference but within ten calendar days after the Effective Date of the Contract, Contractor shall submit a preliminary Progress Schedule for review by Engineer. The preliminary Progress Schedule shall show detailed construction-related activities for the first 60 days of the project. The remainder of the Contract activities shall be shown as summary bars within the milestones of the Work. If Engineer has comments on the preliminary Progress Schedule, Contractor shall make the necessary changes and resubmit it within ten calendar days. No progress payments will be made during the period specified above for the preliminary Progress Schedule until the preliminary Progress Schedule has been accepted by Engineer.
- B. The preliminary Progress Schedule shall:
 - 1. Illustrate a feasible schedule for completion of the Work within the Contract Times and Milestones specified.
 - 2. Provide an elementary example of the schedule in the format to be used for the Progress Schedule.
 - 3. Include the activity code structure as described in Paragraph 19 of this specification.
- C. Preliminary Progress Schedule Submittal Format:

Construction Progress Schedule

1. Contractor shall submit two compact disks of the preliminary Progress Schedule. Compact disks shall be read-write and enable the use of the schedule as an executable file as described herein.
2. A brief narrative shall accompany the submittal, describing Contractor's scheduling approach to the project. The narrative shall include a description of the Contract milestones, approach for construction activities during the period of the preliminary Progress Schedule, description of the general approach of the activities for the work beyond the preliminary Progress Schedule period, a description of the project's critical path, identification of critical long-lead submittals, and planned outages.
3. The narrative shall also incorporate activity codes, calendars, weather days, milestone constraints, and work breakdown structure in accordance with the requirements specified herein.

1.3 PROGRESS SCHEDULE.

- A. The Progress Schedule comprises all the construction-related activities for the Work and shall show the order in which Contractor proposes to carry out the work. Contractor shall include milestones, coordination necessitated by limited access and available work areas, and the availability and use of manpower, material and equipment. Contractor shall use the Progress Schedule to plan, schedule and coordinate the Work including activities of subcontractors, equipment vendors, and suppliers.
- B. The Progress Schedule shall be to the level of detail acceptable to Engineer, and shall include the following:
 1. Organization and structural breakdown of the Project;
 2. Milestones and completion dates;
 3. Type of work to be performed and the labor trades involved;
 4. Purchase, manufacture and delivery activities for major materials and equipment;
 5. Preparation, submittal, and acceptance of shop drawings and material samples;
 6. Deliveries of owner-furnished equipment and/or materials;
 7. Acceptances required by regulatory agencies and/or other third parties;
 8. Assignment of responsibility for each activity;
 9. Access requirements to work areas;
 10. Identification of interfaces and dependencies with preceding, concurrent and follow-on contractors;
 11. Tests, submittal of test reports and acceptance of test results;

Construction Progress Schedule

12. Planning for phased or total acceptance by Owner; including start up and commissioning;
 13. Identification of any manpower, material and equipment restrictions.
 14. Sequence of construction to maintain plant operations;
 15. Planned outages.
- C. The activities included in the Progress Schedule shall be defined in work days. Durations shall be based on the labor (crafts), equipment, and materials required to perform each activity on a normal workday basis. Activity durations shall be 20 working days or less except in the case of non-construction activities such as procurement of materials, delivery of equipment, and concrete curing. All durations shall be the result of definitive manpower and resource planning by Contractor to perform the Work, in consideration of contractually defined on-site work conditions and Contractor's planned means and methods.
- D. When the Progress Schedule is accepted by Engineer, Engineer will save a copy of the Progress Schedule as the baseline schedule, and will use it for analysis of Contractor's progress.
- E. Contractor shall update the Progress Schedule monthly.
- 1.4 ELECTRONIC PROGRESS SCHEDULE FORMAT AND REPORTING.
- A. The Progress Schedule shall be created using Primavera P6 scheduling software. Contractor shall use Engineer's file-naming format throughout the project.
1. Electronic schedule files shall be saved with .XML or .XER file extensions.
 2. Primavera Project Manager settings for "Baseline Type" shall be used in the following manner:
 - a. Select <None> as the baseline type for the preliminary Progress Schedule submittal.
 - b. Once the preliminary and Progress Schedule are accepted, the baseline type shall be named <Initial Plan>.
 - c. Each subsequent Progress Schedule update shall set the baseline type to <Last Performance Update>.
 3. The data date for schedule calculation in the preliminary Progress Schedule and Progress Schedule shall be set as the date of the Notice to Proceed unless otherwise specified by Engineer.
- 1.5 COORDINATING PROGRESS SCHEDULE WITH OTHER CONTRACT SCHEDULES.

- A. Where work is to be performed under this Contract concurrently with or contingent upon work performed on the same facilities or area under other contracts, the Progress

Construction Progress Schedule

Schedule shall be coordinated with the schedules of the other contracts. Owner will provide the schedules of other contracts for preparation and updating of the Progress Schedule. Contractor shall revise the Progress Schedule as required by changes in schedules of other contracts.

- B. In case of interference between the operations of different contractors, Owner will determine the work priority of each contractor and the sequence of work necessary to expedite the completion of the entire project. In all such cases, the decision of Owner shall be accepted as final.

1.6 SUBMITTALS.

A. Progress Schedule Submittals

1. The Progress Schedule and associated reports shall be submitted to Engineer for acceptance within the period of the preliminary Progress Schedule specified herein. If the Progress Schedule is not submitted, no progress payments will be made after the due date until the Progress Schedule has been submitted.
2. Printouts and electronic layouts required as part of the Progress Schedule submittal and monthly updates are as follows:
 - a. Summary Schedule: one page milestone and summary schedule, sorted by total Float, early-start, early-finish;
 - b. Detailed Project Schedule: organized by Work Breakdown Structure (WBS) or area of work; sorted by total Float, early-start, early-finish;
 - c. Critical Path Schedule: sorted based on the total Float, early-start, early-finish;
 - d. 60-Day Look Ahead Schedule: sorted by total Float, early-start, early-finish;
 - e. Activities in Progress: organized by WBS or area of work; sorted by total Float, early-start, early-finish;
 - f. Cash Flow Trending Report: presented in an S-Curve format based on original planned early start and late start forecasted expenditures. In addition, the historical actual data point(s) are to be graphed within the S-Curve graphic report;
 - g. Monthly payment projections;
 - h. Out-of-sequence Report: tabular report showing work performed out-of-sequence.
3. Contractor shall submit additional layouts if directed by Engineer.
4. The submittal shall include the following:
 - a. Narrative report summarizing the milestones, critical path, project approach including phasing or use of crews, significant submittal and fabrication items, coordination or interface requirements, Owner-provided items, and list of subcontractors and vendors.
 - b. Graphic reports including critical path report (longest path), summary schedule report, total Float report by early-start early-finish, look-ahead

Construction Progress Schedule

report grouped by work breakdown structure or project phasing, and cash flow projection. Cash flow projections include estimated cumulative cost curves based on early and late start dates and projection of monthly payments over the life of the project

5. The schedule, critical path, and look-ahead schedules shall be submitted on E (34"x44") size paper or 36" wide plots;
6. The Progress Schedule file shall be submitted in an executable format, using Primavera Project Manager (P6) format on a read-write compact disk.
7. The narrative and graphic reports shall be provided on 8"x11" paper and E-size plots respectively.
8. Contractor shall submit 4 copies of each deliverable.

1.7 MONTHLY SCHEDULE UPDATES.

- A. Monthly Progress Schedule updates shall be submitted for the duration of the Contract on a date agreed to by Owner, Engineer, and Contractor. If monthly Progress Schedule updates are not submitted by the due date, progress payments will be withheld until the required information is submitted.
- B. The updated schedule shall be reviewed each month in a meeting with Engineer to verify:
 1. Actual start dates,
 2. Actual completion dates,
 3. Activity percent completion,
 4. Revised logic (as-built and projected) and changes in activity durations, cost assigned,
 5. Cost influence of change orders, if any,
 6. Revisions due to extension of time.
- C. Prior to each meeting, Contractor shall prepare a complete and accurate report of current procurement and construction progress through the end of the update period, and a depiction of how Contractor plans to continue the Work to meet all contract completion dates. All network changes and status data agreed to during each update meeting shall be considered as accepted by both parties unless written notice of any exceptions is given within five calendar days after the meeting.
- D. For major network changes that cannot be agreed to during an updating meeting, Contractor shall submit the proposed changes for Engineer's acceptance prior to inserting such changes into the network. Submittals may be in the form of marked-up networks, fragnets, or schedule abstracts, provided they are submitted with a letter of transmittal. A fragnet is defined as a sequence of new activities and/or activity

Construction Progress Schedule

revisions that are proposed to be added to the existing schedule to demonstrate how project events have an impact on the schedule.

1.8 DATA DATE.

- A. The data date is the re-settable date in P6 that serves as the end of a reporting period. The reporting period will be recorded on a monthly basis, e.g., January 1st through January 31st with the 31st as the data date. If required for coordination purposes by Owner, Engineer will provide specific data dates to be used by Contractor.

1.9 REVIEW PROCESS.

- A. Engineer will review Contractor's preliminary Progress Schedule and full Progress Schedule submittals within 15 calendar days after receipt of all required information.
- B. At the request of Owner or Engineer, Contractor shall participate in any meetings necessary to reach a mutual agreement and acceptance of the preliminary Progress Schedule, Progress Schedules, or Cash Flow Projections.
- C. If any of the required submittals are returned to Contractor for corrections or revisions, they shall be resubmitted within ten calendar days after the return mailing date. Resubmittals shall include all information and media included in the first submittal. Review and response by Engineer will be given within 10 calendar days after receipt of each resubmittal.
- D. Schedules shall show contract completion of the Work on the Contract completion date and with zero or positive total Float even if Contractor plans to finish early. In no event shall acceptance of the Progress Schedule be a basis for a claim for delay against Owner or Engineer by Contractor for an early finish. A Progress Schedule containing activities with negative Float or that extend beyond the date that the Work is completed and ready for final payment will not be acceptable.
- E. Acceptance of the Progress Schedule by Engineer does not relieve Contractor of responsibility for accomplishing the Work by the Contract completion date. Omissions and errors in the accepted Progress Schedule shall not relieve Contractor of obligations under the Contract. Acceptance by Engineer in no way makes Engineer or Owner an insurer of the Progress Schedule's success or liable for time or cost overruns. Engineer and Owner hereby disclaim any obligation or liability by reason of acceptance of the Progress Schedule by Engineer.

1.10 RESPONSIBILITY FOR SCHEDULE COMPLIANCE.

- A. Whenever it becomes apparent from the current Progress Schedule that the critical path is delayed and the contract completion date will not be met, Contractor shall mitigate the delay by taking some or all of the following actions at no additional cost to Owner.

Construction Progress Schedule

1. Increase construction manpower in such quantities and crafts as will bring the project back on schedule within the completion dates and milestones.
 2. Increase the number of working hours per shift, shifts per day, working days per week, and the amount of construction equipment, or any combination of the foregoing, to substantially eliminate the backlog of work.
 3. Re-schedule activities to achieve maximum practical concurrence of activities and to comply with the schedule date(s).
- B. Within ten calendar days of Engineer's request, Contractor shall submit a recovery schedule and written statement of the steps intended to remove or arrest the delay to the critical path in the schedule. If Contractor fails to submit the required information or should fail to take measures acceptable to Engineer, Engineer with Owner concurrence may direct Contractor to increase man-power, equipment and scheduled work hours to remove or arrest the delay to the critical path and Contractor shall promptly provide such level of effort at no additional cost to Owner.
- C. In the event Contractor fails to follow the updated or revised recovery schedule, Owner may elect to withhold progress payments until Contractor complies with the revised schedule.
- D. Should Contractor's efforts not remove or arrest the delay to the critical path of the accepted schedule, then Owner shall be entitled to supplement Contractor's work-force and equipment to remove and arrest any delay, and shall be entitled to deduct all costs and expenses associated therewith from payments due to Contractor. If insufficient Contract funds remain, Owner may recover such funds from Contractor and its Surety.
- 1.11 CHANGES IN THE WORK, DELAYS, AND EXTENSIONS OF TIME.
- A. When changes in the Work or delays are experienced by Contractor and Contractor requests an extension of time, Contractor shall submit a written time impact analysis to Engineer illustrating the influence of each change or delay to the current Contract Times. Each time impact analysis shall include a fragnet incorporating the change or delay into the Progress Schedule to demonstrate how Contractor was delayed.
- B. Each time impact analysis shall demonstrate the estimated time impact based on the events of the change or the delay; the date the change was given to Contractor or the delay incurred, the status of construction at that point in time, and the event time computation of all activities affected by the change or delay. The event times used in the analysis shall be those included in the latest update of the Progress Schedule or as adjusted for the events of delay.
- C. Three copies of the time impact analysis and an electronic copy on compact disk shall be submitted within seven calendar days of delay occurrence or direction to proceed with a change is given to Contractor. No time extensions will be considered if the time impact analysis is not submitted within the specified time.
- D. Engineer will review Contractor's time impact analysis. Contractor shall furnish such justification and supporting evidence as Engineer deems necessary to determine

Construction Progress Schedule

whether Contractor is entitled to an extension of time. Engineer's review of each time impact analysis will be made within five working days of receipt of the time impact analysis and additional information as required by Engineer, unless subsequent meetings and negotiations are necessary.

- E. The Contract Times will be adjusted only for causes specified in paragraph 15. Time extensions will be granted only to the extent that equitable time adjustments for the activity or activities affected exceed the total or remaining Float along the critical path at the time of actual delay. Delays in activities which are not on the critical path and do not affect Contract Times, will not be considered for an extension of time.

1.12 CAUSES FOR EXTENSIONS OF TIME.

- A. Additional positive total Float in the Progress Schedule generated by efficiencies of Owner or Contractor is a shared commodity to be reasonably used by either party, and belongs exclusively to the Project. Contractor is not entitled to any additional compensation for completion of the project prior to expiration of the Contract Times.
- B. Owner-Initiated Changes. Owner initiated changes to the Work that absorb Float time will not be considered for an extension of time. Owner-initiated changes that affect the critical path of the Progress Schedule shall be grounds for extending or shortening completion dates. Use of Float time for Contractor initiated changes will require Owner's concurrence. Contractor's changes, however, shall give way to Owner-initiated changes competing for the same Float time.
- C. Outside Contractor's Control. Events outside of Contractor's control that affect the critical path of the Progress Schedule will be considered for an extension or reduction of the Contract Times.
- D. Weather Delays. Engineer will obtain weather data during construction from a reputable source, and will maintain weather records. Refer to Section 00700 for Weather-Related Delays.

1.13 AS-BUILT SCHEDULE.

- A. As a condition precedent to release of final payment, the last update to the Progress Schedule submitted shall be identified by Contractor as the "As-Built Schedule". The "As-Built Schedule" shall reflect the exact manner in which the project was actually constructed (including actual start and completion dates, activities, sequences, and logic) and shall be signed and certified by Contractor's project manager.

1.14 SCHEDULING SOFTWARE APPLICATION.

- A. Scheduling software shall be Primavera Project Manager (P6) without exception.

1.15 SCHEDULE SOFTWARE SETTINGS AND RESTRICTIONS

- A. Contractor shall consult with Engineer for acceptable Primavera Project Manager software settings and restrictions. The following shall apply unless otherwise directed by Engineer.
1. Schedule Options:
 - a. Shall be defined only to “Use expected finish dates”;
 - b. Scheduling progressed activities to be set to “Use only retained logic”, not progress override option;
 - c. Critical Path activities defined as total Float less than or equal to zero;
 - d. Calculating start-to-start lag from “early start” dates; and computing total Float as “finish Float = late finish – early finish”;
 - e. alendar to be set for scheduling relationship lag as “Predecessor Activity Calendar.”
 2. Activity progress shall be shown using Remaining Duration. Date format shall be DDMMYY.
 3. Default activity type shall be set to “Independent Task”.
 4. Date/time activity constraint(s), other than those required by the Contract, will not be allowed unless accepted by Engineer. Contractor shall identify proposed constraints and explain the constraint purpose in the Narrative Report.
 5. Lags shall not be used in the creation of an activity that will perform the same function, e.g., concrete cure time. Lag durations contained in the Progress Schedule shall not have a negative value. Contractor shall identify any lag proposed and explain the purpose of the lag in the Narrative Report.
 6. Actual Start and Finish dates shall not be automatically updated by default mechanism that may be included in the CPM scheduling software system. Actual Start and Actual Finish dates on the CPM schedule shall be updated by actual work progression.

1.16 ACTIVITY CODES.

- A. The Primavera (P6) activity codes and work breakdown structure (WBS) to be confirmed or revised by Engineer are listed below. Confirmation or revision of the activity codes and WBS will be provided to Contractor within three workdays of the Effective Date of the Contract. Use of Engineer prescribed activity codes and WBS is mandatory.
- B. “Project Codes” as defined by Primavera P6 is reserved for Owner. Only “Activity Codes” at Project Level will be permitted for Contractor use.

Activity Code	Code Value	Description
---------------	------------	-------------

Construction Progress Schedule

Phase	0005	Construction Phase
Construction Phase	A	Milestones
	BC	Administrative
	D	Submittals
	E	Construction Activities
		Closeout Phase
Submittals	SUB	Submittals
	R&A	Review & Approve
	F&D	Fabricate & Deliver

*Other Codes to be prescribed by
Engineer or requested by
Contractor for project specific
criteria.*

1.17 ACTIVITY RELATIONSHIPS

- A. Relationships between activities shall be identified with the following information:
1. Predecessor and successor activity ID.
 2. Relationship types:
 - a. FS - Finish to start
 - b. SS - Start to start
 - c. FF - Finish to finish
 - d. SF - Start to finish – This relationship is not allowed, unless authorized by Engineer.

1.18 PROJECT CALENDARS

- A. Project Calendars shall use workdays and calendar days as the planning unit for the schedule. Use of Global Calendars is reserved for Owner. Each calendar shall be set to start on Mondays with holidays in accordance with Owner policy. The following calendars shall be used for each activity except as otherwise accepted by Engineer:
1. 5-Day x 8 Hour Workweek (with holidays) shall be used for 5-day 40-hour workweek activities: Monday through Friday. All holidays and non-work days shall be assigned to this calendar. This calendar shall be used for all normal work activities, submittals, and fabricate and delivery activities. This calendar shall be the default calendar for the project unless otherwise specified.

Construction Progress Schedule

2. 5-Day x 10-Hour Workweek (with holidays) shall be used for 5-day 50-hour workweek activities: Monday through Friday. All holidays and non-work days shall be assigned to this calendar.
 3. 6-Day x 10-Hour Workweek (with holidays) shall be used for 6-day 60-hour workweek activities. Monday through Saturday. All holiday and non-work days shall be assigned to this calendar.
 4. 7-Day Calendar (no holidays) shall be used for 7-day workweek activities. No non-work days shall be entered into this calendar.
 5. Additional Calendars may be assigned depending on need. However, Contractor shall consult with Engineer before other calendars are entered and/or used in the Progress Schedule.
- B. The work day to calendar day correlation shall be based on a single shift and 5-day work week with adequate allowance for holidays, adverse weather and all other special requirements of the Work. Contractor may, at his option, propose alternate baseline calendars to allow a second shift and/or a single shift on Saturdays subject to the concurrence and acceptance of Owner. Under no circumstances will a schedule be accepted which allows regularly scheduled work on Sundays.
- C. The holidays observed by Owner are as follows:
1. New Year's Day
 2. Martin Luther King, Jr Birthday
 3. Memorial Day
 4. Juneteenth
 5. July 4th
 6. Labor Day
 7. Veterans Day
 8. Thanksgiving Day
 9. Black Friday
 10. Christmas Eve
 11. Christmas Day
 12. December 26th

Construction Progress Schedule

1.19 FLOAT

- A. Contractor shall not use Float suppression techniques, including preferential sequencing (arranging critical path through activities more susceptible to Owner caused delay); lag logic restraints; zero total or free Float constraints; extended activity times; or imposing constraint dates other than as required by the Contract. Float suppression will be cause for rejection of the preliminary Progress Schedule or full Progress Schedule and its updates.

1.20 MANDATORY MILESTONES

- A. The Contract duration shall be equal to the time period between the Notice to Proceed and the completion of the Work in readiness for final payment. The following milestones are mandatory.
 - 1. Notice to Proceed
 - 2. Milestones, if any, as indicated in Section 00520
 - 3. Substantial Completion as indicated in Section 00520
 - a. To be considered substantially complete, the following portions of the Work must be operational and ready for Owner's continuous use as intended.
 - 1) BNR Aeration Basins 1-6 including new prefabricated enclosure housing each associated MCC and PLC.
 - b. Portions of the Work not essential to plant operation, which can be completed without interruption of plant operation, may be completed after the Work is accepted as substantially complete, and may include the following items:
 - 1) Grassing and site restoration
 - 4. Completion and readiness for final payment, as indicated in Contractor's Bid
- B. The following additional milestones are to be considered and incorporated into the Progress Schedule in accordance with the Contract, if applicable.
 - 1. Permit constraints
 - 2. Facility shut down or outage milestone requirements
 - 3. Applicable phasing milestones
 - 4. Other milestones deemed appropriate by Engineer

Construction Progress Schedule

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

End of Section

This page intentionally left blank.

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SHOP DRAWINGS AND ENGINEERING DATA.

A. General.

1. The Project has been designed by Consulting Engineer and Consulting Engineer will perform design-intent reviews of submittals. Owner, Consulting Engineer, Engineer, and Contractor may develop a protocol for the transmittal of shop drawings, samples, and other submittals.
2. Shop Drawings and engineering data (submittals) covering all equipment and all fabricated components and building materials which will become a permanent part of the Work under this Contract shall be submitted to Engineer for review, as required. Submittals shall verify compliance with the Contract Documents, and shall include drawings and descriptive information in sufficient detail to show the kind, size, arrangement, and the operation of component materials and devices; the external connections, anchorages, and supports required; the performance characteristics; and dimensions needed for installation and correlation with other materials and equipment.
3. Each submittal shall cover items from only one section of the specification unless the item consists of components from several sources. Contractor shall submit a complete initial submittal including all components. When an item consists of components from several sources, Contractor's initial submittal shall be complete including all components.
4. All submittals, regardless of origin, shall be approved by Contractor and clearly identified with the name and number of this Contract, Contractor's name, and references to applicable specification paragraphs and Contract Drawings. Each copy of all submittals, regardless of origin, shall be stamped or affixed with an approval statement of Contractor. Each submittal shall indicate the intended use of the item in the Work. When catalog pages are submitted, applicable items shall be clearly identified and inapplicable data crossed out. The current revision, issue number, and date shall be indicated on all drawings and other descriptive data.
5. Contractor shall be solely responsible for the completeness of each submittal. Contractor's stamp or affixed approval statement of a submittal, per Figure 1-01 33 00, is a representation to Owner and Engineer that Contractor accepts sole responsibility for determining and verifying all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto, and that Contractor has reviewed and coordinated each submittal with other Shop Drawings and with the requirements of the Work and the Contract Documents.
6. All deviations from the requirements of the Contract Documents shall be identified as deviations on each submittal and shall be tabulated in Contractor's letter of transmittal using Figure 2-01 33 00. Such submittals shall, as pertinent to the deviation, indicate

Submittal Procedures

essential details of all changes proposed by Contractor (including modifications to other facilities that may be a result of the deviation) and all required piping and wiring diagrams.

7. For electronic submittals, drawings and the necessary data shall be submitted electronically to Engineer as specified below. Submittal documents shall be in color to facilitate use of red line markups.
 - a. All electronic files shall be in Portable Document Format (PDF) as generated by Adobe Acrobat Professional Version 7.0 or higher.
 - b. The PDF file(s) shall be fully indexed using the Table of Contents, searchable with thumbnails generated. PDF images must be at a readable resolution.
 - c. For most documents, they should be scanned or generated at 300 dots per inch (dpi). Use of higher resolution is acceptable with Owner and Engineer approval.
 - d. Optical Character Recognition (OCR) capture must be performed on these images so that text can be searched, selected and copied from the generated PDF file.
 - e. The PDF documents shall have a bookmark created in the navigation frame for each major entry ("Section" or "Chapter") in the Table of Contents.
 - f. Thumbnails shall be generated for each page or graphic in the PDF file.
 - g. The opening view for each PDF document shall be as follows:
 - 1) Initial View: Bookmarks and Page
 - 2) Magnification: Fit In Window
 - 3) The file shall open to Contractor's transmittal letter, with bookmarks to the left. The first bookmark shall be linked to the Table of Contents.
 - h. PDF document properties shall include the submittal number for the document title and Contractor's name for the author.
 - i. Electronic submittal file sizes shall be limited to 10 MB. When multiple files are required for a submittal the least number of files possible shall be created.
8. Contractor shall post submittals and retrieve Engineer's submittal review comments through the Project website accessible through the Internet. Instruction on procedures for posting and retrieving submittals will be provided after award of the Contract.
9. Facsimiles (fax) will not be acceptable. Submittals will not be accepted from anyone but Contractor. Submittals shall be consecutively numbered in direct sequence of submittal and without division by subcontracts or trades.

B. Engineer's Review of Submittals.

1. Engineer's review of submittals covers only general conformity to the Drawings and Specifications, external connections, and dimensions that affect the layout; it does not indicate thorough review of all dimensions, quantities, and details of the material, equipment, device, or item covered. Engineer's review shall not relieve Contractor of sole responsibility for errors, omissions, or deviations in the drawings and data, nor of Contractor's sole responsibility for compliance with the Contract Documents.
2. Engineer's submittal review period shall be 28 consecutive calendar days and shall commence on the first calendar day following receipt of the submittal or resubmittal in Engineer's office.

Submittal Procedures

3. The time required to mail the submittal or resubmittal back to Contractor shall not be considered a part of the submittal review period.
4. When the drawings and data are returned with review status "NOT ACCEPTABLE" or "RETURNED FOR CORRECTION", the corrections shall be made as instructed by Engineer .
 - a. If submittals are made electronically, the corrected drawings and data shall be resubmitted through the Project website.
 - b. Resubmittals by facsimile or e-mail will not be accepted. When the drawings and data are returned with review status "EXCEPTIONS NOTED", "NO EXCEPTIONS NOTED", or "RECORD COPY", no additional copies need be furnished unless specifically requested by Engineer .

C. Resubmittal of Shop Drawings and Data.

1. Contractor shall accept full responsibility for the completeness of each resubmittal. Contractor shall verify that all corrected data and additional information previously requested by Engineer are provided on the resubmittal. Resubmittals shall be in an organized and consistent format.
2. When corrected copies are resubmitted, Contractor shall direct specific attention to all revisions in writing and shall list separately any revisions made other than those called for by Engineer on previous submittals. Requirements specified for initial submittals shall also apply to resubmittals. Resubmittals shall bear the number of the first submittal followed by a letter (A, B, etc.) or a unique identification that indicates the initial submittal and correct sequence of each resubmittal.
3. If more than one resubmittal is required because of failure of Contractor to provide all previously requested corrected data or additional information, Contractor shall reimburse Owner for the charges of Engineer for review of the additional resubmittals. This does not include initial submittal data such as shop tests and field tests that are submitted after initial submittal.
4. Resubmittals shall be made within 30 days of the date of the letter returning the material to be modified or corrected, unless within 14 days Contractor submits an acceptable request for an extension of the stipulated time period, listing the reasons the resubmittal cannot be completed within that time.
5. The need for more than one resubmittal, or any other delay in obtaining Engineer's review of submittals, will not entitle Contractor to extension of the Contract Times unless delay of the Work is the direct result of a change in the Work authorized by a Change Order or failure of Engineer to review and return any submittal to Contractor within the specified review period.

D. Color Selection.

1. Contractor shall submit samples of colors and finishes for all accepted products before Engineer will coordinate the selection of colors and finishes with Owner. Engineer will prepare a schedule of finishes that includes the colors and finishes selected for both manufactured products and for surfaces to be field painted or finished and will furnish

Submittal Procedures

this schedule to Contractor within 60 days after the date of acceptance of the last color or finish sample.

1.2 OPERATION AND MAINTENANCE DATA AND MANUALS.

- A. Adequate operation and maintenance information shall be supplied for all equipment requiring maintenance or other attention. The equipment Supplier shall prepare a Project specific operation and maintenance manual for each type of equipment indicated in the individual equipment sections or the equipment schedule.
- B. Unless otherwise agreed by Engineer , the operation and maintenance manual for each type of equipment shall only be submitted for review following completion of review of all shop drawings and engineering data pertaining to that equipment.
- C. Parts lists and operating and maintenance instructions shall be furnished for other equipment not listed in the individual equipment sections or the equipment schedule.
- D. Operation and maintenance manuals shall include the following:
 - 1. Equipment function, normal operating characteristics, and limiting conditions.
 - 2. Assembly, installation, alignment, adjustment, and checking instructions.
 - 3. Operating instructions for startup, routine and normal operation, regulation and control, shutdown, and emergency conditions.
 - 4. Lubrication and maintenance instructions.
 - 5. Guide to troubleshooting.
 - 6. Parts lists and predicted life of parts subject to wear.
 - 7. Outline, cross section, and assembly drawings; engineering data; and wiring diagrams.
 - 8. Test data and performance curves, where applicable.
- E. The operation and maintenance manuals shall be in addition to any instructions or parts lists packed with or attached to the equipment when delivered, or which may be required by Contractor.
- F. Electronic Manuals
 - 1. Manuals shall be submitted in electronic format to Engineer prior to the date of shipment of the equipment. The manuals shall be submitted and Engineer's review comments retrieved, through the Project website accessible through the Internet. Instruction on procedures for posting and retrieving O&M submittals and review comments will be provided after award of the Contract. When the O&M manuals are returned with the review status "RETURNED FOR CORRECTION", the corrections shall be made as instructed by Engineer , and corrected manuals resubmitted to Engineer . When review by Engineer is complete, three copies of each electronic O&M manual shall be delivered on CD-ROM to Engineer . Each CD shall contain only one copy of one manual. The

Submittal Procedures

completed O&M manual shall also be filed to the Project website. Delivery of the final O&M shall be made 30 days prior to placing the equipment in operation.

- G. All material shall be marked with Project identification, and inapplicable information shall be marked out or deleted.
- H. Shipment of equipment will not be considered complete until all required manuals and data have been received.
- I. Electronic Operation and Maintenance Manual Requirements.
 - 1. Electronic manuals shall be in Adobe Acrobat's Portable Document Format (PDF), and shall be prepared at a resolution between 300 and 600 dots per inch (dpi), depending on document type.
 - 2. Optical Character Recognition (OCR) capture shall be performed on these documents. OCR settings shall be performed with the "original image with hidden text" option in Adobe Acrobat Exchange.
 - 3. File size shall be limited to 10 MB. A single PDF file greater than 10 MB may only be submitted if acceptable to Owner. When multiple files are required the least number of files possible shall be created.
 - 4. File names shall be in the format OMXXXXXX-YYYZ-V.pdf, where XXXXX is the five digit number corresponding to the specification section, YYY is a three digit O&M manual number, e.g. 001, Z is the letter signifying a resubmittal, A, B, C, etc., and V is a number used only when more than one 10 MB file is required for an O&M manual.
 - 5. Documents prepared in PDF format shall be processed as follows:
 - a. Pages shall be searchable (processed for optical character recognition) and indexed when multiple files are required.
 - b. Pages shall be rotated for viewing in proper orientation.
 - c. A bookmark shall be provided in the navigation frame for each entry in the Table of Contents.
 - d. Embedded thumbnails shall be generated for each completed PDF file.
 - e. The opening view for PDF files shall be as follows:
 - 1) Initial View: Bookmarks and Page
 - 2) Page Number: Title Page (usually Page 1)
 - 3) Magnification: Set to Fit in Window
 - 4) Page: Single Page
 - f. Where the bookmark structure is longer than one page the bookmarks shall be collapsed to show the chapter headings only.
 - g. When multiple files are required the first file of the series (the parent file) shall list every major topic in the Table of Contents. The parent file shall also include minor headings bookmarked based on the Table of Contents. Major headings, whose content is contained in subsequent files (children) shall be linked to be called from the parent to the specific location in the child file. The child file shall contain bookmark entries for both major and minor headings contained in the child file. The first bookmark of any child file shall link back to the parent file and shall

Submittal Procedures

read as follows "Return to the *Equipment Name* Table of Contents", e.g. Return to the Polymer Feed System Table of Contents.

- h. Drawings shall be bookmarked individually.
- i. Files shall be delivered without security settings to permit editing, insertion and deletion of material to update the manual provided by the manufacturer.

J. Labeling

- 1. As a minimum, the following information shall be included on all final O&M manual materials, including CD-ROM disks, jewel cases, and hard copy manuals:

- a. Equipment name and/or O&M title spelled out in complete words.
- b. Project Name.
- c. Owner Project/Contract Number.
- d. Specification Section Number. Example: "Section 15500"
- e. Manufacturer's name.
- f. File Name and Date.

- 2. Label example:

Backwash Pump Operation and Maintenance Manual
Somewhere Plant Expansion
Project/Contract No. ____
Specification Section 11110
Manufacturer
OM11110-001.pdf, 5/05/07

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

End of Section

SUBMITTAL No. _____
SECTION _____
Do not combine multiple sections together
unless required by specifications.

(Contractor's Letterhead)

SUBMITTAL IDENTIFICATION & CONTRACTOR'S APPROVAL STATEMENT

DATE: _____ COPIES _____ DRAWING SHEET NO. _____

Description submittal contents: _____

Location: _____

Manufacturer _____

Subcontractor or Supplier (Optional) _____

REMARKS: _____

CONTRACTOR'S APPROVAL

(_____ Construction Company) has reviewed and coordinated the submitted documentation and verifies that the equipment and material meet the requirements of the Work and the Contract Documents. We accept sole responsibility for determining and verifying all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data contained in the submittal as required by the Contract Documents.

Deviations: ☐ None ☐ Yes (See attached Figure 2- 01 33 00 for written description)

Approved By: _____ Date: _____

This approval does not release subcontractor / vendor from the contractual responsibilities.

This page intentionally left blank.

SUBMITTAL IDENTIFICATION & CONTRACTOR'S APPROVAL STATEMENT

Description submittal contents: _____
 Location: _____
 Manufacturer _____
 Subcontractor or Supplier (Optional) _____

[illegible]

This page intentionally left blank.

SECTION 01 42 13 - ABBREVIATIONS AND ACRONYMS

PART 1 - GENERAL

1.1 LIST OF ABBREVIATIONS.

- A. Abbreviations for standards and organizations used in the Contract Documents are defined as follows:

AA	Aluminum Association
AABC	Associated Air Balance Council
AAMA	Architectural Aluminum Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
ABMA	American Bearing Manufacturers Association
ACI	American Concrete Institute
ACPA	American Concrete Pipe Association
AEIC	Association of Edison Illuminating Companies
AFBMA	Antifriction Bearing Manufacturers Association now recognized as the ABMA
AFPA	American Forest & Paper Association
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AHA	American Hardboard Association
AHRI	Air-Conditioning, Heating and Refrigeration Institute
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Movement and Control Association International
ANSI	American National Standards Institute

Abbreviations and Acronyms

APA	Engineered Wood Association (formerly American Plywood Association)
API	American Petroleum Institute
AREMA	American Railway Engineers and Maintenance-of-Way Association
ASAHC	American Society of Architectural Hardware Consultants
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASSE	American Society of Sanitary Engineers
ASTM	ASTM International
AWG	American Wire Gauge
AWI	Architectural Woodwork Institute
AWPA	American Wood-Preservers' Association
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Institute of America (formerly SCPI)
CDA	Copper Development Association
CISPI	Cast Iron Soil Pipe Institute
CMAA	Crane Manufacturers Association of America
CRA	California Redwood Association
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standard (U.S. Department of Commerce)

Abbreviations and Acronyms

DHI	Door and Hardware Institute
DIPRA	Ductile Iron Pipe Research Association
EEI	Edison Electric Institute
EJCDC	Engineers' Joint Contract Documents Committee
EPA	Environmental Protection Agency
FCC	Federal Communications Commission
FCI	Fluid Controls Institute
Fed Spec	Federal Specification
FGMA	Flat Glass Marketing Association
FHWA	Federal Highway Administration
FIA	Factory Insurance Association
FM	Factory Mutual
FSA	Fluid Sealing Association
HEI	Heat Exchange Institute
HMI	Hoist Manufacturers Institute
HPMA	Hardwood Plywood Manufacturers Association
HTI	Hand Tools Institute
I-B-R	Institute of Boiler and Radiator Manufacturers
IEEE	Institute of Electrical and Electronics Engineers
IBC	International Building Code
IES	Illuminating Engineering Society
IFI	Industrial Fasteners Institute

Abbreviations and Acronyms

IPCEA	Insulated Power Cable Engineers Association
IRI	Industrial Risk Insurers
ISA	International Society of Automation
LEED	Leadership in Energy and Environmental Design
MHI	Materials Handling Institute
MIL	Military Specification
MMA	Monorail Manufacturers Association
MSS	Manufacturers Standardization Society of Valve and Fitting Industry
NAAMM	National Association of Architectural Metals Manufacturers
NACE	NACE International
NBBPVI	National Board of Boiler and Pressure Vessel Inspectors
NBS	See NIST
NCSPA	National Corrugated Steel Pipe Association
NEBB	National Environmental Balancing Bureau
NEC	National Electrical Code
NECA	National Electrical Contractors Association
NEII	National Elevator Industry, Inc.
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NIST	National Institute of Standards and Technology (formerly NBS)
NLA	National Lime Association
NCDOT	North Carolina Department of Transportation

Abbreviations and Acronyms

NPC	National Plumbing Code
NPT	National Pipe Thread
NRMCA	National Ready Mixed Concrete Association
NSC	National Safety Council
NSF	NSF International (formerly National Sanitation Foundation)
NTMA	National Terrazzo and Mosaic Association
NWMA	National Woodwork Manufacturers Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Precast/Prestressed Concrete Institute
PS	Product Standard
RIS	Redwood Inspection Service
SAE	SAE International
SDI	Steel Door Institute
SFPA	Southern Forest Products Association
SI	Système International des Unités (International System of Units)
SIGMA	Sealed Insulating Glass Manufacturers Association
SJI	Steel Joist Institute
SMA	Screen Manufacturers Association
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SPFA	Steel Plate Fabricators Association
SPI	Society of the Plastics Industry

Abbreviations and Acronyms

SPTA	Southern Pressure Treaters Association
SSFI	Scaffolding, Shoring & Forming Institute, Inc
SSPC	SSPC: The Society for Protective Coatings
TABB	Testing, Adjusting, and Balancing Bureau
UL	Underwriters' Laboratories
USBR	U.S. Bureau of Reclamation
USGBC	U.S. Green Building Council
WEF	Water Environment Federation

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

End of Section

PART 1 - Section 01 45 00 - QUALITY CONTROL

PART 2 - GENERAL

2.1 TESTING SERVICES

- A. Testing services shall be provided in accordance with the Contract Documents. All tests to determine compliance with the Contract Documents shall be performed by an independent commercial testing firm acceptable to Engineer and/or Authority Having Jurisdiction excluding testing as specified to be conducted directly by Contractor. The testing firm's laboratory shall be staffed with experienced technicians, properly equipped and fully qualified to perform the tests in accordance with the specified standards.
- B. Testing services provided by Owner are for the sole benefit of Owner and/or as required by the governing building code; however, test results shall be available to Contractor. Testing necessary to satisfy Contractor's internal quality control procedures shall be the sole responsibility of Contractor.
- C. Testing Services Provided by Contractor.
 - 1. Unless otherwise specified, Contractor shall provide all testing services in connection with the following:
 - a. Any Work or part thereof specifically to be inspected, tested or approved by an employee or representative of an Authority Having Jurisdiction. Contractor shall assume full responsibility for arranging and obtaining such inspections, tests or approvals. Contractor shall pay all costs associated for these activities and shall provide the required certificates of inspection or approval.
 - b. Any inspections, tests or approvals required for Owner or Engineer acceptance of materials or equipment to be incorporated in the Work. This includes any items required for acceptance of materials, concrete mix designs or equipment submitted for approval prior to Contractor's purchase for incorporation in the Work.
 - c. Testing, adjusting and balancing of mechanical, electrical and other equipment and systems as specified to be incorporated into the Work. This includes services required by manufacturers of equipment or other products such as concrete repair products, pipe, coatings, linings and roof membranes furnished under the Contract Documents.
 - d. Tightness testing of containment structures and pressure or leakage testing of piping as specified.
 - e. Any Work (or part thereof) required by the Contract Documents to be approved by Owner, Engineer or other designated individual or entity. Contractor shall assume full responsibility for arranging and obtaining such approvals, pay all costs in connection therewith and submit to Engineer the required certificates of approval.

Quality Control

2. Excluding those conducted directly by an Authority Having Jurisdiction or expressly specified to be conducted directly by Contractor, inspections and tests shall be performed by independent inspectors, approved agencies or other qualified individuals or entities acceptable to Owner and Engineer .
- D. Testing Services and Special Inspections Provided by Owner.
1. Unless otherwise specified, Owner shall employ and pay for the services of an independent testing laboratory, approved agency or other qualified individual or entities for inspections, tests or approvals required by the Contract Documents for field quality control and review of onsite materials. These include items indicated as Owner provided:
 - a. Code Required Special Inspections and Procedures
 - b. Other materials and equipment at the discretion of Owner.
- E. Contractor shall provide access to the site and Work in accordance with Contract Documents. Contractor shall give timely notice of the readiness of the Work for inspection, tests or approvals and shall cooperate with the inspection and testing personnel to facilitate the required tests and inspections. Contractor shall furnish all sample materials and cooperate in the testing activities, including sampling, but shall ensure the testing and sampling are permitted with safe construction practices in place. Contractor shall interrupt the Work when necessary to allow scheduled testing, including sampling, to be performed. Contractor shall have no Claim for an increase in Contract Price or Contract Times due to such interruption. When testing activities, including sampling, are performed in the field by Engineer or Agency personnel, Contractor shall furnish personnel and facilities to assist in the activities as required.
- F. Transmittal of Test Reports.
1. Written reports of tests and engineering data furnished by Contractor for Engineer's review of materials and equipment proposed to be used in the Work shall be submitted as specified for Shop Drawings.
 2. The Approved Agency retained by Owner will furnish five copies of a written report of each test. Two copies of each test report will be transmitted to the Resident Project Representative, one copy to the Special Inspector, one copy to Engineer, and one copy to Contractor, within 3 days after each test is completed or as directed by the Statement of Special Inspections as applicable.

2.2 OFFSITE INSPECTION.

- A. Inspection of materials or equipment during the production, manufacturing, or fabricating process, or before shipment, will be performed by Engineer] or an independent testing firm or Approved Agency acceptable to Engineer and Authority Having Jurisdiction as specified in the materials and equipment sections or Structural Tests and Special Inspections section.
- B. Except as otherwise specified in other sections, Contractor shall give appropriate written notice to Engineer not less than 10 days before offsite inspection services are

Quality Control

required, and shall provide for the producer, manufacturer, or fabricator to furnish safe access and proper facilities and to cooperate with inspecting personnel in the performance of their duties.

- C. The inspection organization will submit a written report to Engineer, with a copy to Contractor, at least once each week or as directed by the Statement of Special Inspections as applicable.

2.3 MANUFACTURER'S FIELD SERVICES

- A. Manufacturer's field services shall be as specified herein except as specifically specified in the respective equipment sections.
- B. Services Furnished Under This Contract. An experienced, competent, and authorized representative of the manufacturer of each item of equipment for which field services are indicated in the respective equipment section or in the equipment schedule section shall visit the Site of the Work and inspect, check, adjust if necessary, and approve the equipment installation. In each case, the manufacturer's representative shall be present when the equipment is placed in operation. The manufacturer's representative shall revisit the jobsite as often as necessary until all trouble is corrected and the equipment installation and operation are satisfactory in the opinion of Engineer.
- C. Each manufacturer's representative shall furnish to Owner, through Engineer, a written report certifying that the equipment has been properly installed and lubricated; is in accurate alignment; is free from any undue stress imposed by connecting piping or anchor bolts; and has been operated under full load conditions and that it operated satisfactorily.
- D. All costs for these services shall be included in the Contract Price.

PART 3 - PRODUCTS (NOT USED)

PART 4 - EXECUTION (NOT USED)

End of Section

This page intentionally left blank.

SECTION 01 45 33 - CODE REQUIRED SPECIAL INSPECTIONS AND PROCEDURES

PART 1 - GENERAL

1.1 SCOPE

- A. This specification is intended to assist Owner and Contractor in implementing a special inspections and testing program as described in the building code, and to inform Owner and Contractor and its Suppliers of their code required responsibilities.
- B. Owner, or their agent, will engage one or more Approved Agencies to conduct tests and special inspections specified in this section and other related sections. The Approved Agency shall not be employed by Contractor or a supplier materially participating in the project.
- C. Contractor shall not be responsible for performing the inspections and testing required in this section. Contractor's responsibilities are primarily in a supporting role, and shall be as described herein.

1.2 GENERAL

- A. Structural testing and special inspection services are required to verify compliance with the Contract Documents. These services do not relieve Contractor of responsibility for compliance with the Contract Documents.
- B. Specific quality-assurance and quality-control requirements for individual construction activities are also referenced in other specification sections. Requirements in those sections may also cover production of standard products.

1.3 DEFINITIONS

- A. Approved Agency: An established and recognized agency regularly engaged in conducting tests, furnishing inspection services, or furnishing product certification when such agency has been approved by the Authority Having Jurisdiction.
- B. Approved Fabricator: An established and qualified person, firm or corporation approved by the Authority Having Jurisdiction to perform work without Special Inspection.
- C. Authority Having Jurisdiction (AHJ): The officer or other designated authority charged with the administration and enforcement of the building code, or a duly authorized representative. Also commonly known as the Building Official.
- D. Contract Documents: Written, graphic and pictorial documents prepared or assembled for describing the design, location and physical characteristics of the elements of a project necessary for obtaining a building permit. Contract Documents include all supplemental instructions, sketches, addenda, and revisions to the drawings and specifications issued by the Registered Design Professional beyond those issued for a building permit.

Code Required Special Inspections and Procedures

- E. Pre-Engineered Structural Elements: Structural elements specified by the Registered Design Professional but which may be designed by another Registered Design Professional. (Examples are items such as open web steel joists and joist girders, metal joists, pre-cast concrete elements, pre-fabricated metal buildings, pre-stressed wire wrapped tanks, tilt-up concrete panel reinforcement and lifting hardware.)
- F. Registered Design Professional (RDP): An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the project is to be constructed.
- G. Registered Design Professional in Responsible Charge (RDPRC): A Registered Design Professional engaged by Owner to review and coordinate certain aspects of the project, as determined by the AHJ and Contract Documents, for compatibility with the design of the buildings or structure, including submittal documents prepared by others, deferred submittal documents and phased submittal documents.
- H. Submittal Documents: Written, graphic and pictorial documents prepared and / or assembled by Contractor or Supplier based on the Contract Documents.
- I. Special Inspection: Inspection and/or testing required by the governing building code, as amended by the AHJ, of the materials, installation, fabrication, erection or placement of components and connections requiring special expertise to ensure compliance with approved Contract Documents and referenced standards.
- J. Special Inspector: A qualified person demonstrating competence, to the satisfaction of the AHJ and RDPRC, for inspection of the particular type of construction or operation requiring special inspection. The Special Inspector will be qualified as specified herein.
- K. Testing Agency: A qualified materials testing laboratory under the responsible charge of a Registered Design Professional, approved by the AHJ and the RDPRC, to measure, examine, test, calibrate, or otherwise determine the characteristics or performance of construction materials and verify confirmation with Contract Documents.

1.4 INSPECTION AND TESTING AGENCY QUALIFICATIONS.

- A. The qualifications of all personnel performing special inspection and testing activities will be as required by the applicable building code. Selection of individual inspectors and testing technicians will be subject to the approval of the AHJ and RDPRC.

1.5 CONFLICTING REQUIREMENTS, REPORTS AND TEST RESULTS

- A. Precedence.
 - 1. The Approved Agency reports and testing results shall have precedence over reports and test results provided by Contractor.

1.6 ATTACHMENTS

- A. The following attachments are included for use by Contractor and the Approved Agency. The AHJ may have similar documents that can be used in lieu of these forms.

Code Required Special Inspections and Procedures

Attachment		Notes
Appendix A – Forms for Use by Contractor and Fabricators		
	Contractor’s Statement of Responsibility	To completed by Contractor and relevant suppliers and submitted to Owner and AHJ.
	Fabricator’s Certificate of Compliance	To be completed by Contractor’s Approved Fabricators who perform work without special inspections, and submitted to AHJ and RDPRC prior to placement of the fabricated items in the work.
Appendix B – Forms for Use by Approved Agency		Appendix B shall not be considered as part of these Contract Documents. It is provided for Contractor’s reference, and for benefit of Owner and AHJ.
	Request for Approval of Individual Inspector or Technician	To be completed by Approved Agency. Approved Agency will submit the form to the AHJ and RDPRC for their approval of individual inspectors and testing technicians.
	Final Report of Special Inspections	To be completed and sealed by Approved Agency. Approved Agency or Owner will submit to AHJ at the completion of construction.
Appendix C – Statement of Special Inspections		Appendix C shall not be considered as part of these Contract Documents. It is provided for Contractor’s reference, and to fulfill the code requirements of listing the required inspection program in the construction documents. The Statement of Special Inspections shown in Appendix C is in draft form, and will be fully completed jointly by the RDPRC and the Approved Agency. The RDPRC will seal the Statement of Special Inspections after completion and Contractor or Owner shall submit the completed form to the AHJ as part of the building permit application process.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 CONTRACTOR AND FABRICATOR RESPONSIBILITIES.

- A. Each Fabricator or Contractor responsible for the construction of a seismic-force-resisting system, designated seismic system, seismic resisting component, main wind force-resisting system, or a wind-resisting component listed in the SSI shall submit a “Contractor’s Statement of Responsibility” to the AHJ and to Owner prior to the commencement of work.

Code Required Special Inspections and Procedures

- B. To be considered an Approved Fabricator that may perform work without Special Inspection, the Fabricator shall submit copies of certifications from the International Accreditation Service (IAS) or other recognized and acceptable accreditation organization a minimum of 30 days prior to the start of fabrication. Acceptance as an Approved Fabricator is subject to approval by the AHJ. If the project specifications required an Approved Fabricator, and the AHJ does not accept the Fabricator as an Approved Fabricator, special inspection may become necessary in the Fabricator's shop. Such inspections will be performed by Approved Agency and Contractor shall reimburse Owner for the cost for the inspections.
- C. Contractor shall provide, from each Approved Fabricator, a "Fabricator's Certificate of Compliance" indicating that the work was performed in accordance with the approved Contract Documents. The certificate(s) shall be submitted to the AHJ and the RDPRC prior to placement of the fabricated items into the work.
- D. Contractor shall assist in coordination of the inspection and testing services with the progress of the work. Contractor shall provide sufficient notice to allow proper scheduling of all inspection and testing personnel. Contractor shall provide access to inspection and testing personnel and shall ensure that all work requiring special inspection is not concealed prior to the completion of the inspection and/or testing.
- E. Contractor shall submit schedules to Owner, RDPRC and testing and inspecting agencies. Schedules will note milestones and durations of time for materials requiring tests and special inspections.
- F. Contractor shall provide the Special Inspector access to approved plans at the job site or fabrication shop as applicable.
- G. Contractor shall retain at the job site or fabrication shop, as applicable, all special inspection records submitted by an Approved Agency or Special Inspector and shall provide these records for review by the AHJ's inspector upon request.
- H. Contractor shall repair and/or replace work that does not meet the requirements of the Contract Documents.

3.2 APPROVED AGENCY AND SPECIAL INSPECTOR RESPONSIBILITIES.

- A. Preliminary Approval of Special Inspectors and Testing Technicians
 - 1. The Approved Agency will submit a "Request for Approval of Individual Inspector or Technician" form to the AHJ and RDPRC for each proposed Special Inspector or testing technician. The form will include the individual's credentials, which as a minimum will meet the requirements indicated in this section. The AHJ may have additional requirements to those specified herein. It is the responsibility of the testing and inspection agencies to meet local requirements and comply with local procedures.
- B. Perform Inspections and Tests
 - 1. Be present for and perform continuous or periodic inspections and tests as listed in the SSI for conformance of the work to the AHJ approved Contract Documents. Notify Contractor personnel of their presence and responsibilities. When the SSI column titled "Other Code, Standard or Reference" indicates "Manufacturer's research reports", inspector will obtain the most current ICBO-ES Report, ICC-ES Legacy Report, ICC-ES

Code Required Special Inspections and Procedures

Report, or IAPMO UES Evaluation Report (as applicable) prior to the applicable inspection, for inspection requirements related to the type and brand of products or materials being inspected.

2. Provide additional inspections and testing as necessary to determine compliance with the Contract Documents. Perform special inspections in a timely manner to avoid delay of work.
3. The Approved Agency will be responsible to insure that all inspection or testing activity, whether performed locally or at off-site fabrication facilities, fully complies with this section and the SSI.

C. Interim Inspection Reports

1. Furnish interim inspection reports to the AHJ, the RDPRC, Contractor, Engineer, and Owner during the progress of the work. Frequency of reports will be as established in the SSI. Reports will indicate that work inspected was done in conformance to the approved Contract Documents, or that the work was defective, as applicable.
2. Special inspection reports and test results will include, but not be limited to, the following:
 - a. Project name and address.
 - b. Permit number.
 - c. Special Inspection Agency name, address, and phone number.
 - d. Unique identification of the report and of each page.
 - e. Date and time of inspection.
 - f. Description of inspections or tests performed, including item description and location (reference grid lines, floors, elevations, etc.). Identify approved agencies employed to carry out tests.
 - g. Identification of test/inspection equipment used.
 - h. Statement noting that the work, material, and/or product conforms or does not conform to the construction document requirements. Describe defective items.
 - i. Name and signature of Contractor's representative who was notified of work, material, and/or products that do not meet the construction document requirements.
 - j. Name and signature of Special Inspector and/or testing agency representative performing the work.

D. Report of Defective Work

1. Each agent will maintain a log that identifies work that does not meet the requirements of the Contract Documents. Include:
 - a. Description and exact location.
 - b. Reference to applicable drawings and specifications.
 - c. Reference to original inspection/test report and subsequent dates of re-inspection/retesting.
 - d. Name and title of each individual notified and method of notification.
 - e. How defective items were resolved or unresolved, as applicable.
 - f. Itemized changes authorized by the RDPRC and AHJ if not included in a defective item.

E. Submittal Schedule.

Code Required Special Inspections and Procedures

1. Documentation of reports, test results, and non-compliant work will be submitted at the frequency indicated in the SSI.

F. Final Report of Special Inspections.

1. Each agent listed in the SSI will submit a final report to the Approved Agency documenting the performed special inspections and the correction of any discrepancies noted. The Approved Agency will cumulate the reports and submit a comprehensive final report at a point in time as agreed upon by the permit applicant and the AHJ prior to the start of work.

End of Section

01 45 33 Appendix A

Forms for Use by Contractor and Fabricators

Contractor's Statement of Responsibility

Each Fabricator, Contractor, or Supplier responsible for the construction or fabrication of a system or component designated in the Statement of Special Inspections shall submit this Statement of Responsibility.

Project:

Contractor's or Supplier's Name:

Address:

License No.:

Description of designated building systems and components included in this Statement of Responsibility:

Acknowledgment of Special Requirements

I hereby acknowledge that I have received, read, and understand the Code Required Special Inspections and Tests program and the Schedule of Special Inspections.

I hereby acknowledge that control will be exercised to obtain conformance with the construction documents.

Signature

Date

Title

Fabricator's Certificate of Compliance

Each approved fabricator that is exempt from Special Inspection of their shop fabricated items shall submit this *Fabricator's Certificate of Compliance* at the completion of fabrication.

Project:

Fabricator's Name:

Address:

Certification or Approval Agency:

Certification Number:

Date of Last Audit or Approval:

Description of structural members and assemblies that have been fabricated:

I hereby certify that items described above were fabricated in strict accordance with the construction documents.

Signature

Date

Title

01 45 33 Appendix B

Forms for Use by Approved Agency

Request for Approval of Individual Inspector or Testing Technician

Project:

Project Address:

Name of Inspection/Testing Agency:

Address:

Phone Number:

Name of Primary Inspection Agency's manager/supervisor:

Special Inspector or Testing Technician Name:

Special Inspector or Testing Technician Signature: _____
(as it will appear on reports)

This individual is qualified to inspect:

- | | | |
|--|--|--|
| ☐ Verification of Soils | ☐ Prestressing Concrete | ☐ Metal Building |
| ☐ Earth Retaining Structure | ☐ High Strength Bolting | ☐ EIFS Inspection |
| ☐ Excavation and Filling | ☐ Structural Welding | ☐ Smoke Control |
| ☐ Piling | ☐ Steel Frame Inspection | ☐ Seismic Resistance |
| ☐ Drilled Piers | ☐ Structural Masonry | ☐ Sprayed Fireproofing |
| ☐ Testing of Concrete | ☐ Erection of Precast | ☐ Architectural Systems |
| ☐ Placement of Concrete | ☐ Inspection of Fabricators | ☐ Mechanical Systems |
| ☐ Placement of Shotcrete | ☐ Precast Fabrication | ☐ Electrical Systems |
| ☐ Placement of Rebar | ☐ Structural Steel | |

Current certifications and/or professional licenses retained by the individual:

- | | |
|--|--|
| ☐ Professional Engineer | ☐ ICC Structural Masonry |
| ☐ Geotechnical Engineer | ☐ ICC Structural Steel and Welding |
| ☐ Structural Engineer | ☐ ICC Spray-Applied Fire Proofing |
| ☐ Registered Architect | ☐ ICC Prestressed Concrete |
| ☐ Registered Geologist | ☐ ICC Reinforced Concrete |
| ☐ EI/EIT (min. of 1 yr. related experience) | ☐ ICC Structural Steel and Bolting |
| ☐ GIT (min. of 1 yr. related experience) | ☐ ICC Structural Welding |
| ☐ ACI Concrete Field Testing Technician Grade 1 | ☐ NCMA Concrete Masonry Testing Technician |
| ☐ ACI Concrete Construction Inspector | ☐ NICET Concrete Technician Level II, III, or IV |
| ☐ ACI Laboratory Testing Technician, Grade 1 or 2 | ☐ NICET Soils Technician Level II, III, or IV |
| ☐ ACI Strength Testing Technician | ☐ NICET Geotechnical Engineering Technician
Level II, III, or IV |
| ☐ AWS Certified Welding Inspector | ☐ EDI EIFS |
| ☐ AWS/AISC Certified Structural Steel Inspector | ☐ Other _____ |
| ☐ ASNT NDT Technician Level II or III | |
| ☐ ICC Building Inspector | |

Copies of current certifications and/or professional licenses and a resume showing the individual's work experience are attached.

I hereby certify that in my judgment the individual is qualified to inspect and/or test the items indicated above.

Primary Special Inspection Agency:

Signed: _____ Date: _____
(Primary inspection agency's manager/supervisor)

Final Report of Special Inspections

Project:

Project Address:

Testing / Inspection Agent:

Testing / Inspection Agent Address:

Scope of Testing / Inspections:

To the best of my information, knowledge, and belief, the special inspections or testing required for this project, and designated for this Agent in the Statement of Special Inspections submitted for permit, have been completed in accordance with the contract documents. Based upon my personal observations and written reports, it is my judgment that the inspected work was performed, to the best of my knowledge, in accordance with the building department approved design drawings, specifications, approved change orders, and applicable workmanship provisions of the governing building code.

Interim reports submitted prior to this final report and numbered _____ to _____, form a basis for, and are to be considered an integral part of this final report.

The following discrepancies that were outstanding since the last interim report dated _____ have been corrected:

Items not in conformance, unresolved items or any discrepancies in inspection coverage (i.e., missed inspections, periodic inspections when continuous was required, etc.) are as follows:

Prepared By:

Type or print name

Signature

Date

Special Inspector's Seal

(Licensed Professional)

Appendix C

Statement of Special Inspections

Project:
Project Address:
Permit Applicant:
Applicant Address:
Owner:
Owner Address:

Registered Design Professional in Responsible Charge (RDPRC):

Discipline	Name	License Number	Expiration Date
Structural Engineer			
Geotechnical Engineer			
Mechanical Engineer			
Electrical Engineer			
Architect			

This Statement of Special Inspections includes a *Schedule of Special Inspections* applicable to the above referenced project as well as the identity of the individuals, agencies, or firms intended to be retained for conducting these inspections.

The Special Inspector(s) shall keep records of all inspections and shall furnish interim inspection reports to the Authority Having Jurisdiction (AHJ) and to the Registered Design Professional in Responsible Charge (RDPRC). Discrepancies shall be brought to the immediate attention of the Contractor for correction. If the discrepancies are not corrected, the discrepancies shall be brought to the attention of the AHJ and the RDPRC prior to completion of that phase of work. A *Final Report of Special Inspections* documenting required special inspections and correction of any discrepancies noted in the inspections shall be submitted by each agent.

Inspection work shall be performed in accordance with the following codes and standards. Unless otherwise indicated within the Statement of Special Inspections, the applicable edition for all codes and standards shall be as follows.

Work	In Accordance With
Building Code	2018 North Carolina State Building Code (NCSBC)
Seismic Criteria for Nonstructural Components	ASCE 7-10
Standard Tests and Practices	ASTM International specifications
Concrete	ACI 318-14

Appendix C (Statement of Special Inspections)

RDPRC - Structural	RDPRC - Civil/Geotechnical	RDPRC - Mechanical
RDPRC – Electrical	RDPRC - Architect	

Owner's Acknowledgement:

Signature

Date

Acceptance by Authority Having Jurisdiction:

Signature

Date

Permit No.

Frequency of interim report submittals to AHJ:

☐ 1 week ☐ 2 weeks ☐ Monthly ☐ Bi-Monthly ☐ At Completion ☐ Per attached Schedule

Statement of Special Inspections (Schedule of Inspections)

The attached tables as listed below define the applicable Special Inspections and Procedures.

Table 1 of 9	Geotechnical Special Inspections
Table 2 of 9	Structural Special Inspections
Table 3 of 9	Not Used
Table 4 of 9	Not Used
Table 5 of 9	Testing for Special Inspections
Table 6 of 9	Not Used
Table 7 of 9	Not Used
Table 8 of 9	Not Used
Table 9 of 9	Not Used

The Seismic Design Category for the project is B.

The nominal design wind speed, V_{asd} , for the project is **121** mph (3 second gust) and the wind exposure category is **C**.

Appendix C (Statement of Special Inspections)

Schedule of Special Inspections - Table 1 of 9 (Geotechnical Special Inspections)						
System or Material	Inspection				Remarks	Inspection Agent No. (see Table 9)
	Building Code Reference	Other Reference	Frequency			
			Continuous	Periodic		
Soils						
Verify material below foundation is adequate to achieve design bearing capacity, free of loose, deleterious or foreign material.	1705.6			X (foundation excavation complete)	See Excavation and Fill for Structures specification section.	
Verify excavations for structures are extended to proper depth, proper size and material.	1705.6			X (foundation excavation complete)		
Prior to placement of controlled fill, inspect subgrade and verify site is properly prepared.	1705.6			X (prior to placement of fill)	See Excavation and Fill for Structures specification section.	
Perform classification and testing of compacted fill material to verify compliance with specifications.	1705.6			X (during placement of fill)	See Excavation and Fill for Structures specification section.	
Verify materials, densities, and lift thicknesses during placement and compaction of controlled fill for foundations. Note the exception of Article 1705.6.	1705.6		X		See Excavation and Fill for Structures specification section.	

Appendix C (Statement of Special Inspections)

Schedule of Special Inspections - Table 2 of 9 (Structural Special Inspections)						
System or Material	Inspection				Remarks	Inspection Agent No. (see Table 9)
	Building Code Reference	Other Reference	Frequency			
			Continuous	Periodic		
Concrete (inspections not required for nonstructural concrete slabs supported directly on the ground)						
Reinforcing steel and prestressing tendon condition (free of oil, dirt and loose rust and that properly coated and/or sheathed) and placement. Verify size, spacing, bar clearances, cover, and adequate support to prevent displacement during concrete placement. Verify lap splices, mechanical splices, and embedment lengths. Verify dowels for work above are properly aligned and spaced to match other work.	1705.3	ACI 318 (Ch. 20) ACI 318 (25.2-25.3) ACI 318 (26.6.1-26.6.3		X (prior to closing of forms or delivery of concrete, for each placement)		
Cast-in-place anchor bolts prior to and during placement of concrete.	1705.3	ACI 318 (17.8.2)	X		All bolts visually inspected to verify anchor diameter, location, and embedment length.	
Verify use of approved mix design(s).	1705.3 1904.1	ACI 318 (Ch. 19) ACI 318 (26.4.3-26.4.4)		X	RDPRC to approve contractor's proposed mix design prior to construction. Inspector to verify from concrete delivery ticket that the appropriate mix has been provided prior to placement.	
Formwork shape, location, and dimensions of the concrete member being formed, construction joints properly prepared.	1705.3	ACI 318 (26.11.1.2(b)		X (prior to delivery of concrete for each placement)		
Prior to concrete placement, fabricate specimens for strength tests, perform slump and air content test, and determine the temperature of the concrete.	1705.3	ASTM C31 ASTM C172 ACI 318 (26.12)		X	N/A	

Appendix C (Statement of Special Inspections)

Schedule of Special Inspections - Table 2 of 9 (Structural Special Inspections)						
System or Material	Inspection				Remarks	Inspection Agent No. (see Table 9)
	Building Code Reference	Other Reference	Frequency			
			Continuous	Periodic		
Concrete placement.	1705.3	ACI 318 (26.5.2)	X		Verify that water added at the site does not exceed that allowed by the mix design. Verify conveying, depositing, and consolidation of concrete. Observe placement procedures for evidence of segregation, possible cold joints, displacement of reinforcing or forms, and proper support of embedded items, anchor bolts, etc.	
Concrete curing – maintain temperature and techniques.	1705.3	ACI 318 (26.5.3-26.5.5)		X (during hot, cold, and windy conditions)	For wet-curing, check at the beginning of each day during 7 day curing period	
Post-Installed Anchors – Expansion and Undercut Anchors into Concrete						
Verify anchor type, size, dimensions, location, spacing, edge distance, drill bit type, drill bit diameter, embedment depth, tightening torque, hole dimensions, hole cleaning procedure, concrete compressive strength, concrete thickness, and adherence to the manufacturer's installation instructions.	1705.3 1703.4.2 1705.1.1	Manufacturer's research report		X	Continuous inspection is required if mandated by manufacturer's research report.	
Post-Installed Anchors – Adhesive Anchors into Concrete						

Appendix C (Statement of Special Inspections)

Schedule of Special Inspections - Table 2 of 9 (Structural Special Inspections)						
System or Material	Inspection				Remarks	Inspection Agent No. (see Table 9)
	Building Code Reference	Other Reference	Frequency			
			Continuous	Periodic		
Adhesive anchors installed in other positions: Verify anchor type, size, dimensions, location, spacing, edge distance, embedment depth, tightening torque, hole dimensions, hole cleaning procedure, concrete compressive strength, concrete thickness, adhesive identification, adhesive expiration date, and adherence to the manufacturer's installation instructions.	1705.3 1703.4.2 1705.1.1	Manufacturer's research report		X	Inspection required at start of job for each type and size of adhesive anchor by construction personnel on site. Subsequent installations of the same anchor type and size by the same personnel shall be inspected periodically, unless continuous inspections are mandated by the manufacturer's research report. Any change in the anchor product being installed or the personnel performing the installation shall require another initial inspection.	

Appendix C (Statement of Special Inspections)

Schedule of Special Inspections - Table 3 of 9 (Architectural Special Inspections) Not Used
--

Appendix C (Statement of Special Inspections)

Schedule of Special Inspections - Table 4 of 9 (Inspections for Special Cases) Not Used
--

Appendix C (Statement of Special Inspections)

Schedule of Special Inspections - Table 5 of 9 (Testing for Special Inspections)					
System or Material	Testing			Remarks	Testing Agent No. (see Table 9)
	Building Code Reference	Other Reference	Frequency		
Geotechnical					
Classification of controlled fill material.	1705.6	ASTM D2488	One per stratum of on-site excavated material. One per common supply of off-site material.	See Excavation and Fill for Structures specification section.	
Foundation subgrade, in-place density.	1705.6	ASTM D2922 ASTM D1556 or ASTM D2167 (10% of tests to be ASTM D1556 or ASTM D2167)	One test per 1,000 SY, or as required in the excavation and fill for structures specification. Min one per foundation for foundations over 10 SY.	See Excavation and Fill for Structures specification section.	
Controlled fill beneath foundations, in-place density.	1705.6	ASTM D2922 ASTM D1556 or ASTM D2167 (10% of tests to be ASTM D1556 or ASTM D2167)	One test per 200 CY, or as required in the excavation and fill for structures specification. Min one per foundation for foundations over 10 SY.	See Excavation and Fill for Structures specification section.	
Concrete strength.	1705.3	ASTM C31 ASTM C39 ASTM C172	See concrete specification.	See concrete specification for quantity of cylinders.	
Concrete slump, air content, temperature, unit weight, water soluble chloride ion, shrinkage.	1705.3	ASTM C31 ASTM C138 ASTM C143 ASTM C157 ASTM C172 ASTM C231 ASTM C1064 ASTM C1218	See concrete specification.		

Appendix C (Statement of Special Inspections)

Schedule of Special Inspections - Table 6 of 9 (Special Inspections for Seismic Resistance) Not Used

Appendix C (Statement of Special Inspections)

Schedule of Special Inspections - Table 7 of 9 (Testing for Seismic Resistance) Not Used

Appendix C (Statement of Special Inspections)

Schedule of Special Inspections - Table 8 of 9 (Special Inspections for Wind Resistance) Not Used
--

Appendix C (Statement of Special Inspections)

Schedule of Special Inspections - Table 9 of 9 (Individual Inspection and Testing Agents)					
NAME	LICENSE NO.	FIRM	ADDRESS	EMAIL	PHONE NO.
1.					()
2.					()
3.					()
4.					()
5.					()
6.					()
7.					()
8.					()
9.					()
10.					()

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 UNITS OF MEASUREMENT

- A. When both inch-pound (English) and SI (metric) units of measurement are specified herein, the values expressed in inch-pound units shall govern.

1.2 OFFICE AT SITE OF WORK

- A. During the performance of this Contract, Contractor shall maintain a suitable office at or near the Site which shall be the headquarters of its representative authorized to receive drawings, instructions, or other communication or articles.
- B. Any communication given to the said representative or delivered at Contractor's office at the Site in the representative's absence shall be deemed to have been delivered to Contractor.
- C. Copies of the Drawings, Specifications, and other Contract Documents shall be kept at Contractor's office at the Site and available for use at all times.

1.3 WATER

- A. Potable water in reasonable amounts required for and in connection with the Work to be performed will be furnished at existing fire hydrants by Owner without charge to Contractor. Contractor shall furnish necessary pipe, hose, nozzles, and tools and shall perform all necessary labor. Contractor shall make arrangements with the City Water Department (who will fix the time, rate, and duration of each withdrawal from the distribution system) as to the amount of water required and the time when the water will be needed. Contractor shall install meters on hydrants for monitoring water usage. Unnecessary waste of water will not be tolerated. Special hydrant wrenches shall be used for opening and closing fire hydrants. In no case shall pipe wrenches be used for this purpose.
- B. Non-potable Water (NPW) available on site can be supplied by Owner without charge to Contractor in limited time frames and amounts. Contractor shall take a 30-minutes NPW training on the handling and usage of the NPW prior to use. NPW is used for plant operation and cannot be used continuously in large quantities. Plant is also limited in accepting the used NPW back through the plant processes. NPW usage shall be coordinated with Owner in advance to not impact plant operations. Unnecessary waste of NPW will not be tolerated. Special hydrant wrenches shall be used for opening and closing fire hydrants. In no case shall pipe wrenches be used for this purpose. (Addendum No. 1)

Temporary Facilities and Controls

1.4 POWER

- A. Power for operation of Contractor's plant and equipment in connection with the Work to be done under this Contract shall be provided by Owner without charge to Contractor, subject to the following conditions:
1. The existing heating system will remain in operation and may be utilized by Contractor to the extent available.
 2. Existing lighting systems may be utilized by Contractor to the extent available. Any necessary additional or temporary lighting systems shall be provided by Contractor at no additional cost to Owner.
 3. Power will be available at existing power panels as approved by the Owner.
 4. Power will be available at:
 - a. 120 volts, 60 Hz, single phase
 5. Contractor at its own expense shall make authorized connections to the existing power sources and shall extend temporary service lines to the required areas. Temporary wiring shall conform to Article 590 of the NEC.
 6. Contractor shall at all times provide adequately against waste and needless use of power. Electrical power shall be used only in such quantities as will not interfere with Owner's requirements, and care shall be taken not to overload the existing facilities. Contractor shall provide any additional or temporary electrical power or power of other voltages it may require for prosecution of the Work.
- B. These provisions shall not be construed as a guarantee by Owner of the uninterrupted continuation of power, and interruptions beyond the control of Owner shall not be reason for claims for additional costs nor for extensions of time. Contractor shall provide, at no additional cost to Owner, any necessary power required for prosecution of the Work during such interruptions.

1.5 VOICE AND DATA SERVICES

- A. Contractor shall make all necessary arrangements and pay all installation charges for voice and data lines in its offices at the Site and shall provide all telephone instruments.

1.6 SANITARY FACILITIES

- A. Contractor shall furnish temporary sanitary facilities at the Site, as provided herein, for the needs of all construction workers and others performing work or furnishing services on the Project.
- B. Sanitary facilities shall be of reasonable capacity, properly maintained throughout the construction period, and obscured from public view to the greatest practical extent. If toilets of the chemically treated type are used, at least one toilet will be furnished for each 20 persons. Contractor shall enforce the use of such sanitary facilities by all personnel at the Site.

1.7 MAINTENANCE OF TRAFFIC

- A. Contractor shall conduct its work to interfere as little as possible with public travel, whether vehicular or pedestrian. Whenever it is necessary to cross, obstruct, or close roads, driveways, and walks, whether public or private, Contractor shall provide and maintain suitable and safe bridges, detours, or other temporary expedients for the accommodation of public and private travel, and shall give reasonable notice to owners of private drives before interfering with them. Such maintenance of traffic will not be required when Contractor has obtained permission from the owner and tenant of private property, or from the authority having jurisdiction over public property involved, to obstruct traffic at the designated point.
- B. Detours
 - 1. Where required by the authority having jurisdiction that traffic be maintained over any construction work in a public street, road, or highway, and the traffic cannot be maintained on the alignment of the original roadbed or pavement, Contractor shall, at its own expense, construct and maintain a detour around the construction work.
 - 2. Each detour shall include a bridge across the pipe trench and all necessary barricades, guardrails, approaches, lights, signals, signs, and other devices and precautions necessary for protection of the Work and safety of the public.

1.8 BARRICADES AND LIGHTS

- A. All streets, roads, highways, and other public thoroughfares which are closed to traffic shall be protected by effective barricades on which shall be placed acceptable warning signs. Barricades shall be located at the nearest intersecting public highway or street on each side of the blocked section.
- B. All open trenches and other excavations shall have suitable barricades, signs, and lights to provide adequate protection to the public. Obstructions, such as material piles and equipment, shall be provided with similar warning signs and lights.
- C. All barricades and obstructions shall be illuminated with warning lights from sunset to sunrise. Material storage and conduct of the Work on or alongside public streets and highways shall cause the minimum obstruction and inconvenience to the traveling public.
- D. All barricades, signs, lights, and other protective devices shall be installed and maintained in conformity with applicable statutory requirements and, where within railroad and highway rights-of-way, as required by the authority having jurisdiction.

1.9 FENCES

- A. All existing fences affected by the Work shall be maintained by Contractor until completion of the Work. Fences which interfere with construction operations shall not be relocated or dismantled until written permission is obtained from the owner of the fence, and the period the fence may be left relocated or dismantled has been agreed upon. Where fences must be maintained across the construction easement, adequate gates shall be installed. Gates shall be kept closed and locked at all times when not in use.

Temporary Facilities and Controls

- B. On completion of the Work across any tract of land, Contractor shall restore all fences to their original or to a better condition and to their original locations.

1.10 PROTECTION OF PUBLIC AND PRIVATE PROPERTY

- A. Contractor shall protect, shore, brace, support, and maintain all underground pipes, conduits, drains, and other underground construction uncovered or otherwise affected by its construction operations. All pavement, surfacing, driveways, curbs, walks, buildings, utility poles, guy wires, fences, and other surface structures affected by construction operations, together with all sod and shrubs in yards, parkways, and medians, shall be restored to their original condition, whether within or outside the easement. All replacements shall be made with new materials.
- B. No trees shall be removed outside the permanent easement, except where authorized by Engineer. Whenever practicable, Contractor shall tunnel beneath trees in yards and parkings when on or near the line of trench. Hand excavation shall be employed as necessary to prevent injury to trees. Trees left standing shall be adequately protected against damage from construction operations.
- C. Contractor shall be responsible for all damage to streets, roads, highways, shoulders, ditches, embankments, culverts, bridges, and other public or private property, regardless of location or character, which may be caused by transporting equipment, materials, or workers to or from the Work or any part or site thereof, whether by Contractor or its Subcontractors. Contractor shall make satisfactory and acceptable arrangements with the owner of, or the agency or authority having jurisdiction over, the damaged property concerning its repair or replacement or payment of costs incurred in connection with the damage.
- D. All fire hydrants and water control valves shall be kept free from obstruction and available for use at all times.

1.11 DAMAGE TO EXISTING PROPERTY

- A. Contractor will be held responsible for any damage to existing structures, Work, materials, or equipment because of his operations and shall repair or replace any damaged structures, Work, materials, or equipment to the satisfaction of, and at no additional cost to, Owner.
- B. Contractor shall protect all existing structures and property from damage and shall provide bracing, shoring, or other work necessary for such protection.
- C. Contractor shall be responsible for all damage to streets, roads, curbs, sidewalks, highways, shoulders, ditches, embankments, culverts, bridges, or other public or private property, which may be caused by transporting equipment, materials, or workers to or from the Work. Contractor shall make satisfactory and acceptable arrangements with the agency having jurisdiction over the damaged property concerning its repair or replacement.

1.12 TREE AND PLANT PROTECTION

- A. All trees and other vegetation which must be removed to perform the Work shall be removed and disposed of by Contractor; however, no trees or cultured plants shall be unnecessarily

Temporary Facilities and Controls

removed unless their removal is indicated on the Drawings. All trees and plants not removed shall be protected against injury from construction operations.

- B. Trees considered by Engineer to have any significant effect on construction operations are indicated on the Drawings and those which are to be preserved are so indicated.
- C. Contractor shall take extra measures to protect trees designated to be preserved, such as erecting barricades, trimming to prevent damage from construction equipment, and installing pipe and other Work by means of hand excavation or tunneling methods. Such trees shall not be endangered by stockpiling excavated material or storing equipment against their trunks.
- D. When injuring or removal of trees designated to be preserved cannot be avoided, or when removal and replacement is indicated on the Drawings, each tree injured beyond repair or removed shall be replaced with a similar tree of the nearest size possible.
- E. All trimming, repair, and replacement of trees and plants shall be performed by qualified nurserymen or horticulturists.

1.13 SECURITY

- A. Contractor shall be responsible for protection of the Site, and all Work, materials, equipment, and existing facilities thereon, against vandals and other unauthorized persons.
- B. No Claim shall be made against Owner by reason of any act of an employee or trespasser, and Contractor shall make good all damage to Owner's property resulting from Contractor's failure to provide security measures as specified.
- C. Security measures shall be at least equal to those usually provided by Owner to protect Owner's existing facilities during normal operation, but shall also include such additional security fencing, barricades, lighting, and other measures as required to protect the Site.

1.14 ACCESS ROADS

- A. Contractor shall establish and maintain temporary access roads to various parts of the Site as required to complete the Project. Such roads shall be available for the use of all others performing work or furnishing services in connection with the Project.

1.15 PARKING

- A. Contractor shall provide and maintain suitable parking areas for the use of all workers and others performing work or furnishing services in connection with the Project, as required to avoid any need for parking personal vehicles where they may interfere with public traffic, Owner's operations, or construction activities.

1.16 NOISE CONTROL

- A. Contractor shall take reasonable measures to avoid unnecessary noise. Such measures shall be appropriate for the normal ambient sound levels in the area during working hours. All

Temporary Facilities and Controls

construction machinery and vehicles shall be equipped with practical sound-muffling devices, and operated in a manner to cause the least noise consistent with efficient performance of the Work.

- B. During construction activities on or adjacent to occupied buildings, and when appropriate, Contractor shall erect screens or barriers effective in reducing noise in the building and shall conduct its operations to avoid unnecessary noise which might interfere with the activities of building occupants.

1.17 DUST CONTROL

- A. Contractor shall take reasonable measures to prevent unnecessary dust. Earth surfaces subject to dusting shall be kept moist with water or by application of a chemical dust suppressant. When practicable, dusty materials in piles or in transit shall be covered to prevent blowing dust.
- B. Buildings or operating facilities which may be affected adversely by dust shall be adequately protected from dust. Existing or new machinery, motors, instrument panels, or similar equipment shall be protected by suitable dust screens. Proper ventilation shall be included with dust screens.

1.18 TEMPORARY DRAINAGE PROVISIONS

- A. Contractor shall provide for the drainage of storm water and such water as may be applied or discharged on the Site in performance of the Work. Drainage facilities shall be adequate to prevent damage to the Work, the Site, and adjacent property.
- B. Existing drainage channels and conduits shall be cleaned, enlarged, or supplemented as necessary to carry all increased runoff attributable to Contractor's operations. Dikes shall be constructed as necessary to divert increased runoff from entering adjacent property (except in natural channels), to protect Owner's facilities and the Work, and to direct water to drainage channels or conduits. Ponding shall be provided as necessary to prevent downstream flooding.

1.19 EROSION CONTROL

- A. Contractor shall prevent erosion of soil on the Site and adjacent property resulting from its construction activities. Effective measures shall be initiated prior to the commencement of clearing, grading, excavation, or other operation that will disturb the natural protection.
- B. Work shall be scheduled to expose areas subject to erosion for the shortest possible time, and natural vegetation shall be preserved to the greatest extent practicable. Temporary storage and construction buildings shall be located, and construction traffic routed, to minimize erosion. Temporary fast-growing vegetation or other suitable ground cover shall be provided as necessary to control runoff.

1.20 POLLUTION CONTROL

- A. Contractor shall prevent the pollution of drains and watercourses by sanitary wastes, sediment, debris, and other substances resulting from construction activities. No sanitary wastes shall be

Temporary Facilities and Controls

permitted to enter any drain or watercourse other than sanitary sewers. No sediment, debris, or other substance shall be permitted to enter sanitary sewers, and reasonable measures shall be taken to prevent such materials from entering any drain or watercourse.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

End of Section

This page intentionally left blank.

Section 01 61 00 - GENERAL EQUIPMENT STIPULATIONS

PART 1 - GENERAL

1.1 SCOPE.

- A. When an equipment specification section in this Contract references this section, the equipment shall conform to the general stipulations set forth in this section, except as otherwise specified in other sections.

1.2 COORDINATION.

- A. Contractor shall coordinate all details of the equipment with other related parts of the Work, including verification that all structures, piping, wiring, and equipment components are compatible. Contractor shall be responsible for all structural and other alterations in the Work required to accommodate equipment differing in dimensions or other characteristics from that contemplated in the Drawings or Specifications.

1.3 MANUFACTURER'S EXPERIENCE.

- A. Unless specifically named in the Specifications, a manufacturer shall have furnished equipment of the type and size specified which has been in successful operation for not less than the past 5 years.

1.4 WORKMANSHIP AND MATERIALS.

- A. Contractor shall guarantee all equipment against faulty or inadequate design, improper assembly or erection, defective workmanship or materials, and leakage, breakage, or other failure. Materials shall be suitable for service conditions.
- B. All equipment shall be designed, fabricated, and assembled in accordance with recognized and acceptable engineering and shop practice. Individual parts shall be manufactured to standard sizes and thicknesses so that repair parts, furnished at any time, can be installed in the field. Like parts of duplicate units shall be interchangeable. Equipment shall not have been in service at any time prior to delivery, except as required by tests.

General Equipment Stipulations

- C. Except where otherwise specified, structural and miscellaneous fabricated steel used in equipment shall conform to AISC standards. All structural members shall be designed for shock or vibratory loads. Unless otherwise specified, all steel which will be submerged, all or in part, during normal operation of the equipment shall be at least 1/4 inch thick. When dissimilar metal components are used, consideration shall be given to prevention of galvanic corrosion.

1.5 STRUCTURAL DESIGN REQUIREMENTS.

- A. All equipment, including non-structural components and non-building structures as defined in ASCE 7, and their anchorage, shall be designed and detailed in accordance with the Meteorological and Seismic Design Criteria section.

1.6 LUBRICATION.

- A. Equipment shall be adequately lubricated by systems which require attention no more frequently than weekly during continuous operation. Lubrication systems shall not require attention during startup or shutdown and shall not waste lubricants.
- B. Lubricants of the types recommended by the equipment manufacturer shall be provided in sufficient quantities to fill all lubricant reservoirs and to replace all consumption during testing, startup, and operation prior to acceptance of equipment by Owner. Lubricants for equipment where the lubricants may come in contact with water before or during a potable water treatment process or with potable water, shall be food grade lubricants. This includes lubricants for equipment not normally in contact with water, but where accidental leakage of the lubricants may contaminate the water.
- C. Lubrication facilities shall be convenient and accessible. Oil drains and fill openings shall be easily accessible from the normal operating area or platform. Drains shall allow for convenient collection of waste oil in containers from the normal operating area or platform without removing the unit from its normal installed position.

1.7 ELEVATION.

- A. The elevation of the site shall be as indicated in the Meteorological and Seismic Design Criteria section. All equipment furnished shall be designed to meet stipulated conditions and to operate satisfactorily at the specified elevation.

1.8 DRIVE UNITS.

- A. The nominal input horsepower rating of each gear or speed reducer shall be at least equal to the nameplate horsepower of the drive motor. Drive units shall be designed for 24 hour continuous service.
- B. Gearmotors.
 - 1. The use of gearmotors sharing an integral housing or cutgears into the motor output shaft, or that require removal of lubricant from the gear reducer to change out the motor will not be acceptable.
- C. Gear Reducers.
 - 1. Each gear reducer shall be a totally enclosed unit with oil or grease lubricated, rolling element, antifriction bearings throughout.
- D. Unless superseded by individual specification requirements each helical, spiral bevel, combination bevel-helical, and worm gear reducers shall have a service factor of at least 1.50 based on the nameplate horsepower of the drive motor. Cycloidal gear reducers shall have a service factor of at least 2.0 based on the nameplate horsepower of the drive motor. Shaft-mounted and flange-mounted gear reducers shall be rated AGMA Class III. Helical gear reducers shall have a gear strength rating to catalog rating of 1.5. Each gear reducer shall be designed and manufactured in compliance with applicable most current AGMA standards, except the L₁₀ bearing life shall be 200, 000 hours.
- E. The thermal horsepower rating of each unit shall equal or exceed the nameplate horsepower of the drive motor. During continuous operation, the maximum sump oil temperature shall not rise more than 100°F above the ambient air temperature in the vicinity of the unit and shall not exceed 200°F .
- F. Each grease lubricated bearing shall be installed in a bearing housing designed to facilitate periodic regreasing of the bearing by means of a manually operated grease gun. Each bearing housing shall be designed to evenly distribute new grease, to properly dispose of old grease, and to prevent overgreasing of the bearing. The use of permanently sealed, grease lubricated bearings will not be acceptable in large sized reducers. In small reducers, similar to basin equipment, permanently sealed grease lubricated bearings rated L₁₀ 200,000 hour life may be provided at the manufacturer's option. An internal or external oil pump and appurtenances shall be provided if required to properly lubricate oil lubricated

General Equipment Stipulations

bearings. A dipstick or a sight glass arranged to permit visual inspection of lubricant level shall be provided on each unit.

- G. Gear reducers which require the removal of parts or the periodic disassembly of the unit for cleaning and manual regreasing of bearings will not be acceptable.
- H. Certification shall be furnished by the gear reducer manufacturer indicating that the intended application of each unit has been reviewed in detail by the manufacturer and that the unit provided is fully compatible with the conditions of installation and service.
- I. Adjustable Speed Drives.
 - 1. Each mechanical adjustable speed drive shall have a service factor of at least 1.75 at maximum speed based on the nameplate horsepower of the drive motor. A spare belt shall be provided with each adjustable speed drive unit employing a belt for speed change. Unless specifically permitted by the detailed equipment specifications, bracket type mounting will not be acceptable for variable speed drives.
- J. V-Belt Drives.
 - 1. Each V-belt drive shall include a sliding base or other suitable tension adjustment. V-belt drives shall have a service factor of at least 1.75 at maximum speed based on the nameplate horsepower of the drive motor.

1.9 SAFETY GUARDS.

- A. All belt or chain drives, fan blades, couplings, and other moving or rotating parts shall be covered on all sides by a safety guard. Safety guards shall be fabricated from 16 USS gage thick or thicker galvanized, aluminum-clad sheet steel, or stainless sheet steel or from 1/2 inch mesh galvanized expanded metal, or pultrusion molded UV resistant materials. Each safety guard shall be reinforced or shaped to provide suitable strength to prevent vibration and deflection and shall comply with OSHA. Each guard shall be designed for easy installation and removal. All necessary supports and accessories shall be provided for each guard. Supports and accessories, including bolts, shall be galvanized. All safety guards in outdoor locations shall be designed to prevent the entrance of rain and dripping water.

General Equipment Stipulations

1.10 ANCHOR BOLTS.

- A. Equipment suppliers shall design and detail suitable anchor bolts for each item of equipment. Anchor bolts shall be designed for all operating conditions of the equipment, including wind and seismic loadings when applicable. Wind and seismic loads shall be as indicated in the Meteorological and Seismic Design Criteria section.
- B. Requirements for anchor bolt type, material, and minimum diameter shall be as indicated in the Anchorage in Concrete and Masonry section.
- C. Anchor bolts, together with templates or setting drawings, shall be delivered sufficiently early to permit setting the anchor bolts when the structural concrete or masonry grout is placed.
- D. Unless otherwise indicated or specified, anchor bolts for items of equipment mounted on baseplates shall be long enough to permit 1-1/2 inches of grout beneath the baseplate and to provide adequate anchorage into structural concrete.

1.11 EQUIPMENT BASES.

- A. Unless otherwise indicated or specified, all equipment shall be installed on concrete bases at least 6 inches . Cast iron or welded steel baseplates shall be provided for pumps, compressors, and other equipment. Each unit and its drive assembly shall be supported on a single baseplate of neat design. Baseplates shall have pads for anchoring all components, and adequate grout holes. Baseplates for pumps shall have a means for collecting leakage and a threaded drain connection. Baseplates shall be anchored to the concrete base with suitable anchor bolts and the space beneath filled with grout as specified in the Grouting section.

1.12 SPECIAL TOOLS AND ACCESSORIES.

- A. Equipment requiring periodic repair and adjustment shall be furnished complete with all special tools, instruments, and accessories required for proper maintenance. Equipment requiring special devices for lifting or handling shall be furnished complete with those devices.

General Equipment Stipulations

1.13 SHOP PAINTING.

- A. All iron and steel surfaces of the equipment shall be protected with suitable protective coatings applied in the shop. Surfaces of the equipment that will be inaccessible after assembly shall be protected for the life of the equipment. Coatings shall be suitable for the environment where the equipment is installed. Exposed surfaces shall be finished, thoroughly cleaned, and filled as necessary to provide a smooth, uniform base for painting. Electric motors, speed reducers, starters, and other self-contained or enclosed components shall be shop primed or finished with an epoxy or polyurethane enamel or universal type primer suitable for top coating in the field with a universal primer and aliphatic polyurethane system.
- B. Surfaces to be coated after installation shall be prepared for painting as recommended by the paint manufacturer for the intended service, and then shop painted with one or more coats of a universal primer.
- C. Machined, polished, and nonferrous surfaces which are not to be painted shall be coated with rust-preventive compound as recommended by the equipment manufacturer.

1.14 PREPARATION FOR SHIPMENT.

- A. Equipment shall be prepared for shipment as specified in the Product Requirements section.

1.15 STORAGE.

- A. Handling and storage of equipment shall be as specified in the Product Requirements section.

1.16 INSTALLATION AND OPERATION.

- A. Installation and operation shall be as specified in respective equipment section.

1.17 OBSERVATION OF PERFORMANCE TESTS.

- A. Where the Specifications require the presence of Engineer, initial tests shall be observed or witnessed by Engineer. Owner shall be reimbursed by Contractor

General Equipment Stipulations

for all costs of subsequent visits by Engineer to witness or observe incomplete tests, retesting, or subsequent tests.

1.18 PROGRAMMING SOFTWARE.

- A. Programming software shall be provided for any equipment which includes a programmable logic controller (PLC) or other digital controller that is user-programmable.
- B. The software shall be suitable for loading and running on a laptop personal computer operating with a Windows-based operating system.
- C. A copy of the manufacturer's original operating logic program shall be provided for use in maintaining and troubleshooting the equipment.
- D. Where multiple pieces of equipment, from the same or different vendors, use the same programming software, only one copy of the software need be provided.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

End of Section

This page intentionally left blank.

SECTION 01 65 00 - PRODUCT DELIVERY REQUIREMENTS

PART 1 - GENERAL

1.1 SCOPE.

- A. This section covers packaging and shipping of materials and equipment.

1.2 PREPARATION FOR SHIPMENT.

- A. All equipment shall be suitably packaged to facilitate handling and to protect against damage during transit and storage. All equipment shall be boxed, crated, or otherwise completely enclosed and protected during shipment, handling, and storage. All equipment shall be protected from exposure to the elements and shall be kept dry at all times.
- B. Painted and coated surfaces shall be protected against impact, abrasion, discoloration, and other damage. Painted and coated surfaces which are damaged prior to acceptance of equipment shall be repainted to the satisfaction of Engineer.
- C. Grease and lubricating oil shall be applied to all bearings and similar items.

1.3 SHIPPING.

- A. Before shipping each item of equipment shall be tagged or marked as identified in the delivery schedule or on the Shop Drawings. Complete packing lists and bills of material shall be included with each shipment.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

End of Section

This page intentionally left blank.

SECTION 01 66 00 - PRODUCT STORAGE AND HANDLING REQUIREMENTS

PART 1 - GENERAL

1.1 SCOPE.

- A. This section covers delivery, storage, and handling of materials and equipment.

1.2 DELIVERY.

- A. Contractor shall bear the responsibility for delivery of equipment, spare parts, special tools, and materials to the site and shall comply with the requirements specified herein and shall provide required information concerning the shipment and delivery of the materials specified in this Contract. These requirements also apply to any subsuppliers making direct shipments to the Site.
- B. Contractor shall, either directly or through contractual arrangements with others, accept responsibility for the safe handling and protection of the equipment and materials furnished under this Contract before and after receipt at the port of entry. Acceptance of the equipment shall be made after it is installed, tested, placed in operation and found to comply with all the specified requirements.
- C. All items shall be checked against packing lists immediately on delivery to the site for damage and for shortages. Damage and shortages shall be remedied with the minimum of delay.
- D. Delivery of portions of the equipment in several individual shipments shall be subject to review of Engineer before shipment. When permitted, all such partial shipments shall be plainly marked to identify, to permit easy accumulation, and to facilitate eventual installation.

1.3 STORAGE.

- A. Upon delivery, all equipment and materials shall immediately be stored and protected until installed in the Work.
- B. Stacked items shall be suitably protected from damage by spacers or load distributing supports that are safely arranged. No metalwork (miscellaneous steel shapes and reinforcing steel) shall be stored directly on the ground. Masonry products shall be handled and stored in a manner to hold breakage, chipping, cracking, and spalling to a minimum. Cement, lime, and similar products shall be stored off the ground on pallets and shall be covered and kept completely dry at all times. Pipe, fittings, and valves may be stored out of doors, but must be placed on wooden blocking. PVC pipe, geomembranes, plastic liner, and other plastic materials shall be stored off the ground on pallets and protected from direct sunlight.
- C. Pumps, motors, electrical equipment, and all equipment with antifriction or sleeve bearings shall be stored in weathertight structures maintained at a temperature above 60°F . Electrical equipment, controls, and insulation shall be protected against moisture and water damage. All space heaters furnished in equipment shall be connected and operated continuously.

Product Storage and Handling Requirements

- D. Equipment having moving parts, such as gears, bearings, and seals, shall be stored fully lubricated with oil, grease, etc., unless otherwise instructed by the manufacturer. Manufacturer's storage instructions shall be carefully followed by Contractor.
- E. When required by the equipment manufacturer, moving parts shall be rotated a minimum of twice a month to ensure proper lubrication and to avoid metal to metal "welding". Upon installation of the equipment, Contractor shall, at the discretion of Engineer, start the equipment at one-half load for an adequate period of time to ensure that the equipment does not deteriorate from lack of use.
- F. When required by the equipment manufacturer, lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. New lubricants shall be put into the equipment by Contractor at the time of acceptance.
- G. Equipment and materials shall not show any pitting, rust, decay, or other deleterious effects of storage when installed in the Work.
- H. In addition to the protection specified for prolonged storage, the packaging of spare units and spare parts shall be for export packing and shall be suitable for long-term storage in a damp location. Each spare item shall be packed separately and shall be completely identified on the outside of the container.

1.4 HANDLING.

- A. Stored items shall be laid out to facilitate their retrieval for use in the Work. Care shall be taken when removing the equipment for use to ensure the precise piece of equipment is removed and that it is handled in a manner that does not damage the equipment.
- B. During handling, carbon steel constructed material including chains, straps, and forks on lifting equipment shall not directly contact any equipment or material constructed of stainless steel. It shall be the Contractor's responsibility to correct any carbon steel contamination of stainless steel.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

End of Section

SECTION 01 67 00 -METEOROLOGICAL AND SEISMIC DESIGN CRITERIA

PART 1 - GENERAL

1.1 SCOPE.

- A. Buildings, non-structural components and non-building structures shall be designed in accordance with this section. In the event of conflict with requirements in other sections, the more stringent criteria shall be followed.

1.2 DESIGN CRITERIA.

- A. Buildings, non-structural components, non-building structures including anchorage of such items, shall be designed in accordance with the following criteria.

1. General Design Data		
	Building code and references	2018 NCSBC, ASCE 7-10 “Minimum Design Loads for Buildings and Other Structures”, AISC 360 “Specification for Structural Steel Buildings”, AISC 341 “Seismic Provisions for Structural Steel Buildings”
	Site elevation, above mean sea level (ft)	199.3 (NAVD 88)
	Design flood elevation (ft)	165.50
	Design groundwater elevation (ft)	Not provided
2. Wind Design Data		
	Ultimate design wind speed, V_{ult} (mph)	121
	Nominal design wind speed, V_{asd} (mph)	94
	10 year mean recurrence internal (MRI) serviceability wind speed (mph)	76
	Exposure category	C
	Risk Category	III
	Building enclosure classification	Enclosed
3. Snow Design Data		
	Ground snow load, P_g (psf)	15
	Importance factor (snow loads), I	1.1
	Exposure factor (C_e)	1.0

Meteorological and Seismic Design Criteria

	Thermal factor (C_t)	1.2
4. Ice Design Data		
	Nominal ice thickness, t (in)	0.75
	Concurrent wind speed, V_c (mph)	30
	Importance factor (ice loads – ice thickness), I_i	1.15
	Importance factor (ice loads – concurrent wind), I_w	1.0
5. Seismic Design Data		
	Mapped MCE short period spectral response acceleration, S_s	0.15 g
	Mapped MCE one second period spectral response acceleration, S_1	0.08 g
	Design short period spectral response acceleration, S_{DS}	0.16 g
	Design one second period spectral response acceleration, S_{D1}	0.12 g
	Risk Category	III
	Building Importance factor, I	1.25
	Building Seismic Design Category	B
	Non-Structural Components Importance Factor, I_p	1.0
	Non-Structural Components Seismic Design Category	B
	Non-Building Structures Importance Factors, I	1.0

1.3 WIND ANCHORAGE.

- A. Equipment that is to be located outdoors shall have anchor bolts designed for the effects of wind forces, as determined in accordance with ASCE 7, Chapters 26-31.
- B. Design of anchorage shall be in accordance with the Anchorage in Concrete section.

1.4 SEISMIC DESIGN.

- A. General.
- B. Pre-Engineered Buildings.

Meteorological and Seismic Design Criteria

1. Pre-engineered buildings shall have sufficient strength and ductility to resist the specified seismic effects defined for buildings and shall meet all of the design, proportioning, detailing, inspection, and quality assurance provisions of the specified building code.
2. "W" for buildings shall include the total dead load, the total operating weight of permanent equipment and the effective contents of vessels, and applicable portions of other loads, as required by the specified building code.

C. Non-Structural Components.

1. Non-structural components are architectural, mechanical, and electrical items that are permanently attached to and supported by a structure but are not part of the structural system, as indicated in Chapter 13 of ASCE 7. All Non-structural components and Non-Building Structures are exempt from seismic design.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

End of Section

Meteorological and Seismic Design Criteria

Section 01 68 00 - EQUIPMENT AND VALVE IDENTIFICATION

PART 1 - GENERAL

1.1 SCOPE.

- A. This section covers the furnishing and installation of nameplates and tags for identification of equipment, valves, panels, and instruments.

1.2 GENERAL.

- A. Except as otherwise specified in equipment, valve, and instrumentation sections, nameplates and tags shall be as specified herein. Nameplates or tags shall be provided for all equipment, valves, operator interfaces, control and electrical panels, cabinets, instruments, and instrument racks that have been named and/or tagged on the Drawings.

1.3 SUBMITTALS.

- A. Drawings and Data
 - 1. Drawings and data shall be submitted in accordance with the requirements of the Submittals Procedures section for each type of tag provided including materials, colors, sizes, letter sizes, and installation instructions.

PART 2 - PRODUCTS (NOT USED)

2.1 EQUIPMENT NUMBER PLATES.

- A. All equipment tagged on the drawings, except for submerged equipment shall be provided with number plates bearing the equipment tag number identified on the Drawings.
- B. Number plates shall be bevelled, 1/8th inch thick laminated black phenolic plastic engraving stock with white core. Lettering on number plates shall be capitalized block letters 3/4 inch high.

Equipment and Valve Identification

- C. Number plate height shall be twice the letter height. Number plate length shall be as needed, with suitable margins all around.
- D. Lettering shall be placed in one row where practicable; however, where necessary due to excessive length, lettering shall be placed on more than one row and centered.
- E. Number plates shall be attached with stainless steel panhead screws, rivets, or drive screws.
- F. When a number plate cannot be installed due to the physical size, space, or mounting surface geometry of the equipment, the Contractor shall provide a 12 gauge stainless steel tag with engraved or imprinted equipment tag number. Lettering on tags shall be ¼ inch high. Tags shall be rectangular with smooth edges and shall be fastened to the equipment with stainless steel mechanical fasteners or with a stainless steel chain.

2.2 EQUIPMENT INFORMATION PLATES.

- A. Equipment shall be provided with engraved or stamped equipment information plates securely affixed with mechanical fasteners to the equipment in an accessible and visible location.
- B. Equipment information plates shall be in addition to the number plates specified.
- C. Equipment information plates shall indicate the manufacturer's name, address, product name, catalog number, serial number, capacity, operating and power characteristics, labels of tested compliances, and any other pertinent design data.
- D. Equipment information plates listing the distributing agent only will not be acceptable.

2.3 VALVE AND GATE TAGS.

- A. Temporary Tags.
 - 1. Each valve and gate with an identifying number indicated on the Drawings or listed in the valve or gate schedule, shall be tagged or marked in the factory with the identifying number.
- B. Permanent Tags.

Equipment and Valve Identification

1. All valves and gates, except buried or submerged valves, that have been assigned a number on the Drawings or in the valve or gate schedule, shall be provided with a permanent number plate.
 2. Tags shall be permanently attached to valves and gates with stainless steel mechanical fasteners or with stainless steel chains. Numerals shall be $\frac{3}{4}$ inch 20 mm high and shall be black baked enamel on an anodized aluminum plate.
- C. All buried valves shall be tagged with a brass plate cast into a 6-inch by 6 inch concrete pad at grade next to the valve box. The valve number shall be engraved in the brass plate with lettering and numerals at least 1 inch high.

2.4 PANEL NAMEPLATES.

- A. Nameplates shall be provided on the face of each panel and cabinet. Panel identification nameplates shall be mounted at the top of the panel shall include the panel descriptive name and tag number as indicated on the Drawings, in two or three lines of text. Lettering shall be $\frac{3}{4}$ inch high.
- B. Nameplates for devices mounted on or in the panel shall be inscribed with the text as indicated on the Drawings. Where nameplate information is not indicated on the Drawings, inscriptions shall be in accordance with information in the supplier's submittal drawings as guided by information in the relevant specification section. Panel device nameplates shall have engraved letters $\frac{3}{16}$ inch high.
- C. Nameplate material and size shall be as specified above for equipment number plates. Nameplates shall be secured to the panel with stainless steel panhead screws.

2.5 INSTRUMENT TAGS.

- A. Temporary Tags.
 1. Where instruments are not provided with permanent tags furnished from the factory, instruments shall be tagged or marked in the factory with the instrument tag number indicated on the Drawings.
- B. Permanent Tags.

Equipment and Valve Identification

1. Instruments shall be tagged with the instrument tag number indicated on the Drawings. Tags shall be 12 gauge stainless steel with engraved or imprinted symbols. Lettering on tags shall be ¼ inch high. Tags shall be rectangular with smooth edges and shall be fastened to the instrument with stainless steel mechanical fasteners or with a stainless steel chain.

PART 3 - EXECUTION (NOT USED)

End of Section

SECTION 01 73 19 - EQUIPMENT INSTALLATION

PART 1 - GENERAL

1.1 SCOPE.

- A. This section covers general installation requirements of new equipment units that have been purchased by Contractor as part of this Work. Equipment specific installation requirements are covered in the equipment sections.

1.2 GENERAL.

- A. Equipment installed under this section shall be erected and placed in proper operating condition in full conformity with Drawings, Specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by Engineer.
- B. Any equipment identified as being provided by others will be furnished complete for installation by Contractor. Technical specifications under which the equipment will be purchased are available.
- C. Any existing equipment which is removed and salvaged for reinstallation shall be handled as indicated in the Summary of Work section.
- D. Coordination.
 - 1. When manufacturer's field services are provided by the equipment manufacturer, Contractor shall coordinate the services with the equipment manufacturer. Contractor shall give Engineer written notice at least 30 days prior to the need for manufacturer's field services furnished by others.
 - 2. Submittals for equipment furnished by others under each procurement contract will be furnished to Contractor upon completion of review by Engineer. Contractor shall review equipment submittals and coordinate with the requirements of the Work and the Contract Documents. Contractor accepts sole responsibility for determining and verifying all quantities, dimensions, and field construction criteria.
 - 3. Flanged connections to equipment including the bolts, nuts, and gaskets are covered in the appropriate pipe specification section.

1.3 DELIVERY, STORAGE, AND HANDLING.

- A. Storage.

Equipment Installation

1. Upon delivery, all equipment and materials shall immediately be stored and protected by Contractor until installed in the Work.
2. Equipment shall be protected by Contractor against damage and exposure from the elements. At no time shall the equipment be stored on or come into contact with the ground, grass, or any other type of vegetation.
3. Contractor shall keep the equipment dry at all times.

PART 2 - PRODUCTS

2.1 MATERIALS.

A. Materials shall be as follows:

1. Grout: As specified in the Grouting section.
2. Anti-Seize thread lubricant for SS bolts: As specified in the Anchorage in Concrete and Masonry section.

PART 3 - EXECUTION

3.1 INSTALLATION.

- A. Equipment shall not be installed or operated except by, or with the guidance of, qualified personnel having the knowledge and experience necessary to obtain proper results as specified in the Startup Requirements section.
- B. Each equipment unit shall be leveled, aligned, and shimmed into position. Installation procedures shall be as recommended by the equipment manufacturer and as required herein. Shimming between machined surfaces will not be permitted.
- C. Anti-seize thread lubricant shall be liberally applied to the threaded portion of all stainless steel bolts during assembly. For equipment installed in drinking water facilities, the anti-seize lubricant shall meet requirements of NSF-61.
- D. When specified in the equipment sections, the equipment manufacturer will provide installation supervision and installation checks. For installation supervision, the manufacturer's field representative will observe, instruct, guide, and direct Contractor's erection or installation procedures as specified in the equipment specifications. For installation checks, the manufacturer's field representative will inspect the equipment installation immediately following installation by Contractor, and observe the tests indicated in the each equipment section. The manufacturer's representatives will revisit the site as often as necessary to ensure installation satisfactory to Owner.
- E. All equipment shall be protected after installation, prior to final acceptance by Owner. Protection provisions shall be as recommended by the manufacturer, and shall include

Equipment Installation

provisions to prevent rust, mechanical damage, and foreign objects entering the equipment.

3.2 STARTUP AND TESTING.

- A. Startup requirements, and tests associated with startup shall be as indicated in the specific equipment sections. Startup and tests required shall occur in the order listed in the following paragraphs. Tests shall not begin until any installation supervision and installation checks by the equipment manufacturer have been completed, except where noted below.
- B. Preliminary Field Tests.
 - 1. Preliminary field tests shall be conducted on all equipment by Contractor as indicated in the individual equipment sections. When an installation check is specified in the equipment sections, the equipment manufacturer's representative will participate in these tests to the extent described in the respective equipment sections.
- C. Field System Operation Tests.
 - 1. Field system operation tests shall be conducted on all equipment by Contractor as indicated in the respective equipment sections. When an installation check is specified in the equipment sections, the equipment manufacturer's service personnel will participate in these tests to the extent described in the respective equipment sections.
- D. Field Demonstration Tests.
 - 1. Field demonstration tests will be conducted by the equipment manufacturer on equipment as indicated and as specified in the equipment sections.
- E. Field Performance Tests & Distribution Tests.
 - 1. Field performance tests or distribution tests will be conducted by the equipment manufacturer on equipment as indicated and as specified in the equipment sections.
- F. Field Baseline Performance Tests.
 - 1. Field baseline performance tests shall be conducted by Contractor on the equipment indicated in the equipment sections, and the tests shall be performed as indicated. When indicated in the equipment sections, the equipment manufacturer will participate in these tests. This test shall not be considered an acceptance test, but rather a test to determine initial performance curves and efficiency just prior to the equipment entering service.

End of Section

This page intentionally left blank.

Demolition

SECTION 02 41 00 - DEMOLITION

PART 1 - GENERAL

1.1 SCOPE

- A. This section covers the demolition of existing structures, piping, equipment, and sitework and the salvage of existing materials and equipment as indicated on the Drawings.

1.2 GENERAL

- A. Contractor shall be responsible for all work under this section. Contractor shall provide *14* days written notice prior to beginning demolition activities.
- B. All structures and facilities of the existing *site* which are not to be removed must remain in continuous operation during the work.
- C. Demolition work shall create minimum interference with Owner's operations and minimum inconvenience to Owner. Contractor shall provide protection and safety of all roadways, sidewalks, and all accessible areas during demolition activities.
- D. Blasting will not be permitted.

1.3 SUBMITTALS

- A. Demolition Plan.
 - 1. Contractor shall submit a detailed demolition plan indicating the major demolition activities, planned dates, Owner coordination requirements, permit requirements (if any), and any special planning considerations that require coordination with third-parties.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 DEMOLITION

- A. Removal of equipment or facilities shall include removal of all accessories, piping, wiring, supports, associated electrical starters and devices, baseplates and frames, and all other appurtenances, unless otherwise directed. Existing materials and equipment removed, and not indicated to be reused as a part of the Work, shall become Contractor's property unless

Demolition

otherwise specified, and shall be removed from the Site and properly disposed of or recycled in accordance with state laws.

- B. Contractor shall conduct demolition activities in a manner that prevents damage to existing facilities which are indicated to remain and shall provide all necessary protection for existing facilities. Any remaining facilities damaged during demolition shall be repaired by Contractor to a condition equal to or better than the original condition.
- C. When demolition is complete, all debris shall be removed from the Site and the Site graded to the lines and grades indicated on the Drawings.
- D. Structure Demolition
 - 1. The structures as shown on the Drawings shall be demolished and removed from the jobsite.
- E. Piping and Equipment Demolition
 - 1. The piping and equipment as shown on the Drawings shall be removed and shall become the property of Contractor. All such items shall be promptly removed from the jobsite.
- F. Sitework Demolition
 - 1. Sitework demolition shall be as shown on the Drawings.

End of Section

SECTION 03 30 53 - MISCELLANEOUS CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SCOPE

- A. This section covers all cast-in-place concrete, including reinforcing steel, forms, finishing, curing, and appurtenant work.

1.2 SUBMITTALS

- A. All submittals shall be made in accordance with the Submittal Procedures section.
- B. The following items shall be submitted, as a minimum.

Manufacturer's information for all products and concrete ingredients supplied under this section, in the form of technical data sheets, certificates of compliance, test data, or reports.

Items required to verify the concrete mixture:

Aggregate reports (ASTM C33 and ASTM C1778)

Source and type

Gradation

Deleterious materials

Alkali-aggregate reactivity

Cement mill report

Fly ash or slag cement test report

Admixture data sheets

Proposed mixture proportions

Concrete compressive strength at 28 days

Bar lists and drawings for the fabrication and placing of reinforcement, with sufficient plans, elevations, and sections to adequately detail and label all reinforcement. Bar drawings shall also include a reference to the structure where the reinforcement is to be installed and the relevant contract drawings showing the reinforcement.

PART 2 - PRODUCTS

2.1 LIMITING REQUIREMENTS

- A. Unless otherwise specified, concrete shall be controlled within the following limiting requirements:

Cement Content	Suitable for meeting the performance requirements of this specification.
Maximum Water-Cement Ratio	The maximum water-cement ratio shall be 0.45 on a weight basis, or, if fly ash or slag cement are used, the combined mass of cement plus fly ash or slag cement shall be used to determine the water-cementitious materials ratio.
Fly Ash or Slag Cement Content	At the option of Contractor, fly ash or slag cement may be substituted for portland cement, on the basis of 1.0 lb added for each 1.0 lb of cement reduction. Fly ash replacement shall be within a range of 15 to 25 percent. Slag cement replacement shall be within a range of 25 to 50 percent.
Concrete Strength	4,500 psi minimum compressive strength at 28 days.
Air Content	6 percent $\pm$ 1.5 percent.
Coarse Aggregate	Maximum nominal coarse aggregate size, 1 inch . Recycled aggregates, or aggregates created from crushed concrete, will not be acceptable.
Admixtures	A water-reducing admixture and an air-entraining admixture shall be included in all concrete. No calcium chloride or admixture containing chloride from sources other than impurities in admixture ingredients will be acceptable.
Consistency	Workable, without segregation, with slump not more than 5 inches when concrete is placed.

2.2 MATERIALS

Cement	ASTM C150 Type I, II or 1/II, or ASTM C595 Type II. ASTM C595 cements that incorporate C1157 cements will not be acceptable.
--------	--

Miscellaneous Cast-in-Place Concrete (20 cy)

Fly Ash	ASTM C618, Classes F, C, or N, with the following exceptions. • Loss on ignition shall not exceed 4 percent. • Class C may only be used if it also qualifies for moderate sulfate resistance as described in ASTM C618, Table 3, Procedure A. The test for sulfate resistance shall be in accordance with ASTM C1012. • Class N shall be also subject to the optional physical requirements testing indicated in ASTM C618, Table 3.
Slag Cement	ASTM C989, Grade 100 or Grade 120.
Fine Aggregate	Non-reactive, clean, natural sand, ASTM C33.
Coarse Aggregate	Non-reactive crushed rock, washed gravel, or other inert granular material conforming to ASTM C33, Class D4 except that clay and shale particles shall not exceed 1 percent.
Water	Potable. Water from concrete mixing operations shall not be used.
Admixtures	
Water-Reducing	ASTM C494, Type A or D.
Air-Entraining	ASTM C260.
High-Range Water Reducing	ASTM C494, Type F or G.
Reinforcing Steel	
Bars	ASTM A615, Grade 60, deformed.
Bar Supports	CRSI Class 1, plastic protected; or Class 2, stainless steel protected.
Expansion joint materials	
Filler	Preformed sponge rubber. ASTM D1752, Type I.
Filler Adhesive	As recommended by manufacturer.
Sealant	
Thiokol Sealants (polysulfides)	Fed Spec TT-S-00227E, Class A or ASTM 920
Self-Leveling, nonsubmerged	Type M; polysulfide rubber, two component. C. Horn "Hornflex Traffic Grade"; Polymeric Systems "PSI-350."

Miscellaneous Cast-in-Place Concrete (20 cy)

Urethane Sealants (Polyurethanes) Self-Leveling, Nonsubmerged	Fed Spec TT-S-00227E, Class A, Type 2 and ASTM C920, Type M, Grade NS, two component. Bostik "Chem-Calk 550"; Tremco "Vulkem 245"; Pecora "Urexpan NR-200"; Polymeric Systems "RC-2SL"; Tremco "THC-900."
Form Coating	Nonstaining and nontoxic after 30 days. Product shall not exceed VOC limits established by the federal, state, or local regulatory agency having jurisdiction over the project site.
Evaporation Retarder	Dayton Superior "AquaFilm Concentrate J74", Euclid "Eucobar", L&M Chemical "E-Con", Master Builders Solutions "MasterKure ER50", Sika "SikaFilm", or SpecChem "SpecFilm".
Colloidal Silica Finishing Aid	Dayton Superior "Superior Finishing Aid", or Solomon "Day1".
Membrane Curing Compound	ASTM C309 (unmodified), Type 1, Class B; or ASTM C1315, Type I, Class A. Product shall not exceed VOC limits established by the federal, state, or local regulatory agency having jurisdiction over the project site.
Floor Sealer	ASTM C1315, Type I, Class A, minimum 25 percent solids, acrylic, non-yellowing, unit moisture loss 0.40 kg/m ² maximum in 72 hours. Product shall not exceed VOC limits established by the federal, state, or local regulatory agency having jurisdiction over the project site.
Polyethylene Film	Product Standard PS17 or ASTM D4397, 6 mils or thicker.

2.3 MIXTURE DESIGN AND TESTING

- A. All reports and tests required for Engineer acceptance of materials and concrete mixtures shall be made at the expense of Contractor. Mixtures shall be adjusted in the field as necessary, within the limits specified, to meet the requirements of these specifications. If the type or source of any concrete ingredient is changed during the contract, including a change from ASTM C150 to ASTM C595 cement, concrete work shall pause until the new materials and the new mixture design are acceptable to Engineer. Testing of the new mixture may be necessary.
- B. Review of Materials
 - 1. The source and quality of concrete materials shall be submitted to Engineer for review before concrete is placed.
- C. Proposed Mixture Proportions

Miscellaneous Cast-in-Place Concrete (20 cy)

1. Proposed proportions of concrete shall meet the limiting requirements indicated herein.

D. Field Test Record Data

1. Concrete mixtures may be qualified based on field test record performance data. Field test data records shall be from the production facility being used on the current Project and shall have been performed in the past 24 months. Field test records shall represent a single group of at least 10 consecutive strength tests for one mixture, using the same materials, under the same conditions, and encompassing a period of not less than 45 days.

2.4 FORMS

- A. Forms shall be designed to produce hardened concrete having the shape, lines, and dimensions indicated on the drawings. Forms shall be substantial and sufficiently tight to prevent leakage of mortar and shall be maintained in proper position and accurate alignment.
- B. Forms shall be thoroughly cleaned and coated before concrete is placed.
- C. Form-facing materials shall be selected in accordance with ACI 347.3R, based upon the applicable formed concrete surface category. Formed concrete surface categories vary by structure and application, and shall be as indicated in the Finishing Formed Surfaces paragraph.

2.5 REINFORCEMENT

- A. Reinforcement shall be accurately formed and positioned, and shall be maintained in proper position while the concrete is being placed and compacted. Reinforcement shall be free from dirt, loose rust, scale, and contaminants. Mechanical connectors shall be used only as indicated on the drawings.

PART 3 - EXECUTION

3.1 BATCHING, MIXING, AND DELIVERY

- A. Concrete shall be furnished by a ready-mixed concrete manufacturer (plant) and trucks which are certified by the National Ready Mixed Concrete Association's (NRMCA) Plant and Truck Certification Program, and shall conform to ASTM C94 except as indicated otherwise in this specification. The time from start of concrete mixing to completion of discharge from the truck shall not exceed 1-1/2 hours.

3.2 PLACEMENT

- A. Concrete shall be conveyed to the point of final deposit and placed by methods which will prevent segregation or loss of the ingredients. During and immediately after placement, concrete shall be thoroughly compacted and worked around all reinforcement and embedments and into the corners of the forms. Unless otherwise authorized, compaction shall be by

Miscellaneous Cast-in-Place Concrete (20 cy)

immersion-type vibrators. The use of "jitterbug" tampers to compact concrete flatwork will not be permitted.

B. Polyethylene Film

1. Where concrete is placed against gravel or crushed rock which does not contain at least 25 percent material passing a No. 4 sieve, such surfaces shall be covered with polyethylene film. Joints in the film shall be lapped at least 6 inches and taped.

C. Cold Weather Concreting

1. Except as modified herein, cold weather concreting shall comply with ACI 306.1.

D. Hot Weather Concreting

1. Except as modified herein, hot weather concreting shall comply with ACI 305.1.

3.3 TOLERANCES

- A. Tolerances for cast-in-place concrete work shall be as indicated in ACI 117, and ACI 347.3R based upon the relevant formed concrete surface category.
- B. Formed concrete surfaces that are to have a face-mounted flat steel or FRP member attached, including but not limited to items such as weir plates or shelf angles, shall have more stringent flatness requirements. The surface profile shall permit the installation of the flat member without grinding the concrete surface (except for removal of fins), deforming the flat member, or requiring usage of backer rods or shims.

3.4 FINISHING

A. Finishing Formed Surfaces

1. Formed concrete surfaces shall meet all criteria of the relevant formed concrete surface category (CSC), as defined in ACI 347.3R, except as indicated otherwise herein. Surfaces shall be assigned to CSC's as indicated.

Formed Concrete Surface Category	Applicable Surfaces	Mockup Required
CSC1	Formed concrete surfaces that will be in permanent contact with earth backfill.	No
CSC2	All other formed concrete surfaces not designated otherwise.	No

2. Fins, form seams, and construction joints shall be ground flush on all surfaces in formed concrete surface category CSC2, and in CSC1 surfaces that are required to be dampproofed.

Miscellaneous Cast-in-Place Concrete (20 cy)

3. All tie holes in formed surfaces, regardless of the relevant CSC, shall be cleaned, wetted, and filled with patching mortar. The patches shall be finished flush and cured and shall match the texture and color of the adjacent concrete.
 4. Concrete surfaces to be dampproofed shall have fins removed and tie holes filled, but no additional finishing will be required.
 5. Concrete surfaces to be painted shall have sharp edges and projections removed to provide an acceptable condition for painting. The concrete surfaces shall have bug holes filled per the Protective Coatings section.
- B. Unless otherwise specified, unformed surfaces shall be given a float finish.
- C. Application of Evaporation Retarder
1. Concrete flatwork subject to rapid evaporation due to hot weather, drying winds, and sunlight; or if bleed water sheen is not visible on the concrete surface after strike-off and initial floating; shall be protected with an evaporation retarder. The evaporation retarder shall form a continuous film on the surface of fresh, plastic concrete. Follow ACI 308.1-23 Section 3.2; “evaporation retarder” is synonymous with “evaporation reducer.”
 2. Immediately following screeding, evaporation retarder shall be sprayed over the entire surface of fresh, plastic concrete flatwork at a rate of not less than 200 square feet per gallon, in accordance with the manufacturer's recommendations. The spray equipment shall have sufficient capacity to continuously spray the product at approximately 40 psi with a suitable nozzle as recommended by the manufacturer.
 3. The sprayable solution shall be prepared as recommended by the manufacturer.
 4. The evaporation retarder shall not be worked into the surface and shall not be used as a finishing aid. Evaporation retarder shall be allowed to fully evaporate prior to subsequent finishing operations.
 5. Under severe evaporative conditions, additional applications of evaporation retarder may be required following each floating or troweling, except the last finishing operation.
- D. Sidewalks
1. Concrete surfaces shall be screeded to the proper elevation and contour. All aggregates shall be completely embedded in mortar. Screeded surfaces shall be given an initial float finish as soon as the concrete has stiffened sufficiently for proper working. Any piece of coarse aggregate which is disturbed by the float or which causes a surface irregularity shall be removed and replaced with mortar. Initial floating shall produce a surface of uniform texture and appearance, with no unnecessary working of the surface. Initial floating shall be followed by a second floating at the time of initial set.
 2. Floated surfaces shall be given a light broom finish, using a horsehair broom, to provide a nonslip surface. Brooming shall be done at right angles to the length of the walk.
 3. Sidewalks shall be edged using a 3 or 4 inch wide edging tool with a 1/8 inch corner radius. Edger lap marks at corners of each slab shall be carefully removed. False joints

Miscellaneous Cast-in-Place Concrete (20 cy)

shall be provided at right angles to the length of the walk, using a grooving tool with 1/8 inch radius. The finished edge on each side of the joint shall be the same width as the edging tool used. False joints shall divide each sidewalk into square sections.

4. The finished surface of all sidewalks shall be neat in appearance, shall be sloped to drain, and shall not pond water.

3.5 CURING

- A. Concrete shall be protected from loss of moisture for at least 7 days by membrane curing or by water curing, except that when concrete is being protected from low temperatures, the duration of water curing may be shortened to one day less than the duration of the cold weather protection. Membrane curing compound shall be applied as recommended by the manufacturer. Water curing shall be in accordance with ACI 308.1.

End of Section

SECTION 05 50 00 - MISCELLANEOUS METAL FABRICATIONS

PART 1 - GENERAL

1.1 SCOPE.

- A. This section covers the fabrication and erection of miscellaneous metal items not covered in other sections.
- B. The items covered by this section include, but are not limited to, the following:
 - 1. Metal framing and supports for door frames made of structural shapes.
 - 2. Metal framing and supports for mechanical and electrical equipment.
 - 3. Metal shapes used at door sills.
 - 4. Metal shapes used for applications not indicated in other sections.
 - 5. Miscellaneous steel trim.
 - 6. Clevises and Turnbuckles.
 - 7. Eyebolts and Eyenuts.
 - 8. Bird screen.

1.2 SUBMITTALS.

- A. All submittals shall be made in accordance with the Submittal Procedures section.
- B. The following items shall be submitted, as a minimum.
 - 1. Manufacturer's information for all products supplied under this section, in the form of technical data sheets, certificates of compliance, test data, or reports.
 - 2. Fabrication, setting, and erection drawings, identifying all bolted and welded connections.
 - 3. For items designed by a delegated designer, submit a confirmation statement that the special inspection and testing requirements indicated in the Code Required Special Inspections and Procedures specification are sufficient. Any additional special inspection or testing required by the delegated designer shall be submitted to Engineer for inclusion into the special inspection program.
- C. Drawings and Data

Miscellaneous Metal Fabrications

1. Complete data, fabrication drawings, and setting or erection drawings covering all miscellaneous metal items shall be submitted in accordance with the Submittal Procedures section.

D. Connection and Welding Details

1. All bolted connections and welds shall be properly identified on the shop drawings. Welding procedures, welding procedure qualification records and welder qualifications shall be submitted.

1.3 DELIVERY, STORAGE, AND HANDLING.

- A. Materials shall be handled, transported, and delivered in a manner which will prevent bends, dents, significant coating damage, or corrosion. Damaged materials shall be promptly replaced. Miscellaneous metal work shall be stored on blocking so that no metal touches the ground and water cannot collect thereon. The material shall be protected against bending under its own weight or superimposed loads.

PART 2 - PRODUCTS

2.1 GENERAL.

- A. All miscellaneous metals shall be detailed and fabricated to facilitate installation as indicated on the drawings. All required field connection materials shall be furnished.

2.2 MATERIALS.

Steel

Shapes, Plates, and Bars	ASTM A572 Grade 50 or ASTM A992.
Sheets	ASTM A1008 CS Type B or A1011 CS Type B.
Pipe	ASTM A53, Type E or S, Grade B ($F_y = 35$ ksi).
Round Hollow Structural Sections	ASTM A500, Grade C ($F_y = 50$ ksi).
Square and Rectangular Hollow Structural Sections	ASTM A500, Grade C ($F_y = 50$ ksi).
Fasteners	
Bolts, Unfinished	ASTM A307.

Miscellaneous Metal Fabrications

Nuts, Heavy-Hex	ASTM A563, grade and finish compatible with bolts.
Washers	Flat, hardened, ASTM F436, Type 1.
Forged Steel Clevises and Turnbuckles	AISI C-1035.
Forged Steel Eyebolts and Eyenuts	AISI C-1030, ANSI B 18.15 Type 2 shoulder pattern unless otherwise required.
Stainless Steel	
Shapes	ASTM A1069 or A276, Type 316L.
Plates	ASTM A240, Type 316L.
Pipe	ASTM A312, Grade TP316L.
Tube	ASTM A269, Grade TP316L.
Fasteners	
Bolts	ASTM F593, Alloy Group 1 or 2, minimum yield strength of 45 ksi.
Nuts	ASTM F594, Alloy Group shall match that of the bolts. Nuts shall have a minimum proof stress equal to or greater than the minimum full-size tensile strength of the bolts
Washers	Flat, ANSI/ASME B18.22.1, Type 316.
Cast Iron	ASTM A48, Class 35B or better.
Aluminum	
Sheet and Plate	ASTM B209, Alloy 6061-T6.
Rolled Sections	ASTM B308, Alloy 6061-T6.
Rod and Bar (Rolled or Drawn)	ASTM B211, Alloy 6061-T6 or 2017-T4.
Extrusions	ASTM B221, Alloy 6063-T5 or T6.
Pipe	ASTM B429, Alloy 6061-T6.
Castings	ASTM B26 or B85.

Miscellaneous Metal Fabrications

Brass or Bronze

Plate and Strip	ASTM B36.
Casting	ASTM B61 or B584.
Fasteners	
Bolts and Nuts	IFI-104, Grade 462 or 464.
Washers	Flat, ANSI/ASME B18.22.1.

Silicon Bronze

Sheet and Plate	ASTM B96, American Brass "Everdur 1010".
Castings	ASTM B584, American Brass "Everdur 1000".
Fasteners	
Bolts and Nuts	IFI-104, Grade 655.
Washers	Flat, ANSI B18.22.1.

Weld Metal (Steel Connections)

ANSI/AWS D1.1, Table 3.1, filler metal with minimum 70 ksi tensile strength unless otherwise required.

Anchors into Concrete Elements	As indicated in the Anchorage in Concrete section.
--------------------------------	--

Bird Screen	2 mesh brass or copper wire cloth, min wire dia 0.063 inch .
-------------	--

Body Solder	Flux-core wire, ASTM B32, Alloy Grade 20B.
-------------	--

Shop Coatings

Universal Primer	As indicated in the Protective Coatings section.
Galvanizing	ASTM A123, A153, A385, and F2329 as applicable.

2.3 FABRICATION.

A. General.

1. Items shall be preassembled in the shop to greatest extent possible. Metals shall be cut, drilled, and punched cleanly and accurately. Sharp or rough edges on exposed surfaces shall be removed.

B. Fasteners.

1. Unless indicated otherwise on the Drawings, stainless steel fasteners shall be used for fastening aluminum or stainless steel, steel fasteners shall be used for fastening steel, and bronze fasteners shall be used for fastening bronze.

2.4 SHOP COATING.

- A. All miscellaneous metal items shall be shop coated as specified herein, except as otherwise indicated. The requirements for field painting are covered in the Protective Coatings section.

- B. Contact surfaces of miscellaneous metals that are to be field welded shall be masked so that no shop primer or galvanizing will be applied in the vicinity of the weld.

C. Cleaning.

1. Surfaces shall be dry and of proper temperature when coated, and shall be free of grease, oil, dirt, dust, grit, rust, loose mill scale, weld flux, slag, weld spatter, and other objectionable substances. Articles to be galvanized shall be pickled before galvanizing. All other ferrous metal surfaces shall be cleaned by solvent, high-speed power wire brushing or by blasting to the extent recommended by the shop coating manufacturer.

D. Edge Grinding.

1. Sharp projections of cut or sheared edges of ferrous metals shall be ground to a radius as needed to ensure satisfactory shop coating adherence.

E. Galvanizing.

1. Unless otherwise indicated herein or on the Drawings, all steel in exterior locations shall be galvanized. All galvanizing shall be done by the hot-dip process after fabrication. An approved zinc-rich paint shall be used to touch up minor coating damage, in accordance with ASTM A780. Materials with significant coating damage shall be regalvanized or replaced.
2. Bolts, nuts, and washers shall be galvanized when connected materials are galvanized or where indicated on the Drawings. The use of zinc-plated bolts will not be acceptable.

F. Prime Painted Steel.

Miscellaneous Metal Fabrications

1. Unless otherwise specified or indicated on the Drawings, all ungalvanized steel shall be given a shop coat of universal primer after fabrication. The dry film thickness of the universal primer shall be at least 5 mils . Steel surfaces shall be coated as soon as practicable after cleaning. Steel shall not be moved or handled until the shop coat is dry and hard.

G. Stainless Steel.

1. Unless otherwise specified, all items fabricated from stainless steel shall be thoroughly cleaned and degreased after fabrication. Pickling or a light blast cleaning shall produce a modest etch and remove all embedded iron and heat tint. Surfaces shall be subjected to a 24 hour water test or a ferroxyl test to detect the presence of residual embedded iron and shall be retreated as needed to remove all traces of iron contamination. Surfaces shall be adequately protected during shipping and handling to prevent contact with iron or steel objects or surfaces.

H. Aluminum.

1. All surfaces of aluminum which will be in contact with concrete, mortar, or dissimilar metals shall be given a coat of bituminous paint.

I. Castings.

1. Shop coating of miscellaneous iron castings will not be required.

J. Other Surfaces.

1. Painting of zinc coated steel or bronze surfaces will not be required.

PART 3 - EXECUTION

3.1 GENERAL.

- A. Miscellaneous metals shall be placed in accurate location, alignment, and elevation. Edges and surfaces shall be free of warps, local deformations, and unauthorized bends. Connections shall be accurately fitted.
- B. Field welding or cutting shall not be performed on galvanized or primed surfaces.

3.2 BOLTED CONNECTIONS.

- A. Unless otherwise indicated on the Drawings all bolted connections shall be snug tight.

3.3 WELDING.

- A. Welds that are exposed to view shall be ground smooth. Intermittent welds shall have an effective length of at least 2 inches and shall be spaced not more than 6 inches apart.

Miscellaneous Metal Fabrications

- B. Surfaces within 2 inches of a weld shall be free from loose or thick scale, slag, rust, moisture, grease, paint and other foreign materials that would prevent proper welding or release objectionable fumes.

End of Section

This page intentionally left blank.

SECTION 05 81 00 - ANCHORAGE IN CONCRETE

PART 1 - GENERAL

1.1 SCOPE

- A. This section covers the design and installation of anchors in concrete. It includes cast-in-place anchor bolts and anchor rods, adhesive anchors for both threaded rods and reinforcing bars, expansion anchors, screw anchors, and undercut anchors.

1.2 GENERAL

A. Anchors Designed by Engineer

1. Cast-in-place and post-installed anchors that are fully detailed on the Drawings have been designed by Engineer, unless noted otherwise.
2. Anchors detailed on the Drawings as cast-in-place shall not be changed to a post-installed type without approval of Engineer.
3. Post-installed anchors identified on the Drawings as a specific manufacturer and product shall not be changed to a different post-installed manufacturer or product without approval of Engineer.
4. Post-installed anchors identified on the Drawings as a specific anchor type, but indicating no specific product, may use any of the listed products of that anchor type.
5. Contractor shall reimburse Engineer, through Owner, for Engineer's design costs related to evaluating alternative anchor types, products, or details.

B. Anchors Designed by Contractor or Contractor's Suppliers

1. Contractor or Contractor's material suppliers shall be responsible for design of anchors for delegated design items such as railings, ladders, equipment, pipe supports, pre-engineered structures, and other manufactured items, as indicated in the Drawings and Specifications.
2. Cast-in-place anchors shall be used unless post-installed types are indicated on the Drawings or accepted by Engineer.
3. Adhesive anchors used in vibrating applications shall only be used if the anchor manufacturer submits documentation indicating that the product is suitable for the anticipated service conditions.
4. Anchors shall be designed for loads due to all operating conditions, plus relevant snow, wind, and seismic loadings as indicated in the Meteorological and Seismic Design Criteria section.

Anchorage in Concrete

5. Seismic anchorage design for non-structural components shall include the overstrength factors indicated in ASCE 7, Tables 13.5-1 and 13.6-1, when applicable.
6. Design of anchorage into concrete shall be in accordance with ACI 318 Chapter 17, shall consider concrete to be cracked, and shall not include the strengthening effects of supplementary reinforcement or anchor reinforcement unless approved by Engineer.
7. Post installed anchors shall be designed in accordance with the anchor manufacturer's research report, and shall consider the applicable effects of anchor spacing, edge distances, embedment depths, and temperature.
8. Anchorage calculations performed by Contractor's suppliers shall utilize design tools applicable to the specific anchorage products intended to be used by Contractor.

C. Materials

1. Unless otherwise indicated, anchors of structural steel members connected to concrete shall have a diameter of at least 3/4 inch. Anchors equipment shall have a diameter of at least 1/2 inch.
2. Unless otherwise indicated on the Drawings, anchors used in the following locations and applications shall be of the indicated materials.

Cast-In-Place Anchor Bolts and Anchor Rods

Submerged locations	Stainless steel.
Locations subject to splashing	Stainless steel.
Buried locations	Stainless steel.
Anchorage of structural steel columns	Galvanized steel.
Other exterior locations	Galvanized steel.
Interior locations not subject to corrosion	Carbon steel.

Adhesive, Expansion, Screw, and Undercut Anchors

Submerged locations	Stainless steel.
Locations subject to splashing	Stainless steel.
Buried locations	Stainless steel.
Anchorage of structural steel columns	Stainless steel.
Other exterior locations	Stainless steel.
Interior locations not subject to corrosion	Carbon steel.

1.3 SUBMITTALS

- A. All submittals shall be made in accordance with the Submittal Procedures section.
- B. The following items shall be submitted, as a minimum.

Anchorage in Concrete

1. Manufacturer's information for all products supplied under this section, in the form of manufacturer's research reports (from independent organizations such as ICC-ES or IAPMO UES), technical data sheets, and certificates of compliance.
2. Shop drawings for anchor bolts, anchor rods, and post-installed anchors, including anchor manufacturer, products, and embedment depth. Shop drawings for anchors designed by Contractor's suppliers shall be sealed by a professional engineer licensed in the state of the project.
3. Anchorage calculations performed by Contractor's delegated designers. Calculations shall be prepared and sealed by a professional engineer licensed in the state of the project.
4. For anchors designed by Contractor's delegated designers, a confirmation statement that the special inspection and testing requirements indicated in the Code Required Special Inspections and Procedures specification are sufficient. Any additional special inspection or testing required by Contractor's delegated designers shall be submitted to Engineer for inclusion into the special inspection program.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Materials shall be handled, transported, and delivered in a manner which will prevent damage or corrosion. Damaged materials shall be promptly replaced. Materials shall be shipped and stored in original manufacturer's packaging.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Unless otherwise indicated on the drawings, materials shall be as indicated below.

Cast-In-Place Anchor Bolts and Anchor Rods

Carbon steel	ASTM F1554, Grade 36 with compatible nuts.
Galvanized steel	ASTM F1554, Grade 36 with compatible nuts; hot-dip galvanized, ASTM F2329.
Stainless steel	Bolts, ASTM F593, Alloy Group 1 or 2 (minimum yield strength of 45 ksi); nuts, ASTM F594, Alloy Group 1 or 2.
Flat Washers	ANSI B18.22.1; of the same material as anchor bolts and nuts.
Expansion Anchors in Concrete	Products shall be single component anchors tested in accordance with ICC AC193 and shall have a manufacturer's research report in compliance with the applicable building code. The anchors shall be approved for use in cracked concrete, and for resisting seismic forces.
Carbon Steel	Hilti "Kwik-Bolt TZ2", Simpson "Strong-Bolt 2", or DeWalt "Power-Stud+SD2".

Anchorage in Concrete

Stainless Steel	Hilti “Kwik-Bolt TZ2 SS304”, Hilti “Kwik-Bolt TZ2 SS316”, Simpson “Strong-Bolt 2”, DeWalt “Power-Stud+SD4”, or DeWalt “Power-Stud+SD6”.
Screw Anchors in Concrete	Products shall be single component anchors tested in accordance with ICC AC193 and shall have a manufacturer’s research report in compliance with the applicable building code. The anchors shall be approved for use in cracked concrete, and for resisting seismic forces.
Carbon Steel	Hilti “KH-EZ”, Simpson “Titen HD”, or DeWalt “Screw-Bolt+”.
Stainless Steel	Hilti “KH-EZ” or Simpson “Titen HD”.
Undercut Anchors in Concrete	Products shall be tested in accordance with ICC AC193 and shall have a manufacturer’s research report in compliance with the applicable building code.
Carbon Steel	Hilti “HDA-P Undercut Anchor”, or DeWalt “CCU+ Undercut Anchor”.
Stainless Steel	Hilti “HDA-PR Undercut Anchor”.
Adhesive Anchors in Concrete	Products shall be tested in accordance with ICC AC308, and shall have a manufacturer’s research report in compliance with the applicable building code. The anchors shall be approved for use in cracked concrete, and for resisting seismic forces.
Threaded Rods and Nuts (Carbon Steel)	ASTM A307 or ASTM F1554 Grade 36.
Threaded Rods and Nuts (Stainless Steel)	ASTM F593, CW.
Reinforcing Bars	ASTM A615, Grade 60, deformed.
Adhesive (Epoxy)	Hilti “HIT-RE 500 V3,” Simpson “SET-3G”, or DeWalt “Pure 110+.”
Adhesive (Acrylic)	Hilti “HIT-HY 200 V3”, Simpson “AT-3G”, or DeWalt “AC200+”.

2.2 ANCHORS

A. Cast-in-Place Anchor Bolts and Anchor Rods

1. Cast-in-place anchor bolts and anchor rods shall have forged heads or embedded nuts and washers. Anchors shall be delivered in time to permit setting prior to the placing of structural concrete. Anchor sleeves shall not be used unless acceptable to Engineer. Unless installed in sleeves, anchor bolts and anchor rods shall be provided with sufficient threads to permit a nut to be installed on the concrete side of the concrete form or the supporting template. Two nuts, a jam nut, and a washer shall be furnished for cast-in-place anchor bolts and anchor rods indicated on the Drawings to have locknuts; two nuts

Anchorage in Concrete

and a washer shall be furnished for cast-in-place anchor bolts and anchor rods without locknuts.

B. Adhesive, Expansion, Screw, and Undercut Anchors

1. Unless otherwise noted, single nuts and washers shall be provided with adhesive anchors, expansion anchors, screw anchors, and undercut anchors. Adhesive anchors shall be free of coatings that would weaken the bond with the adhesive.

PART 3 - EXECUTION

3.1 GENERAL

- A. Anti-seize thread lubricant shall be liberally applied to projecting, threaded portions of stainless steel anchors immediately before tightening of the nuts.
- B. Compliance with Manufacturer's Instructions
 1. Post-installed anchors shall be installed in accordance with the manufacturer's printed installation instructions and all applicable requirements of the manufacturer's research report for the specific anchor system. If conflicts are found between the Drawings, the manufacturer's printed installation instructions, and the manufacturer's research report installation requirements, Contractor shall notify Engineer for resolution.
- C. Special Inspection
 1. Special inspection requirements for cast-in-place and post-installed anchors shall be as indicated in the Code-Required Special Inspections and Procedures section. Anchorage work shall be performed in a manner that allows the inspections to take place without adversely impacting the schedule.

3.2 CAST-IN-PLACE ANCHOR BOLTS AND ANCHOR RODS

- A. Cast-in-place anchor bolts and anchor rods shall be carefully positioned with templates and secured in the forms prior to placing concrete, or in masonry bond beams prior to placing grout. Contractor shall verify that anchorage devices are positioned in accordance with the Drawings and with applicable equipment or structure submittal drawings.
- B. Threads, bolts, and nuts spattered with concrete or masonry grout during placement shall be cleaned prior to final installation of the bolts and nuts.
- C. Sleeves shall be filled with non-shrink grout.

3.3 ADHESIVE ANCHORS

- A. Adhesive shall be statically mixed in the field during application. All proportioning and mixing of the components shall be in accordance with the manufacturer's recommendations.

Anchorage in Concrete

- B. Anchors or bars shall be installed in holes hammer drilled into hardened concrete. Diameter of holes shall be 1/16 inch larger than the outside diameter of the rod or bar unless recommended otherwise by the anchor system manufacturer. Holes shall be prepared by removing all dust and debris using procedures recommended by the adhesive manufacturer.
- C. Adhesive anchors and holes shall be clean, dry, and free of grease and other foreign matter at the time of installation. The adhesive shall be placed and the rods or bars shall be set in accordance with the recommendations of the manufacturer. Care shall be taken to ensure that all spaces and cavities are filled with adhesive, without voids.
- D. Concrete Installation
 - 1. Unless indicated otherwise on the Drawings, reinforcing bars shall be embedded to a depth of 15 bar diameters, and threaded rods shall be embedded to a depth that will develop the yield strength of the rod.
 - 2. Adhesive anchors in concrete shall be installed under the following conditions.

Minimum Age of Concrete	21 days.
Prior to Anchor Installation	
Concrete Temperature Range	Maximum short-term temperature 162° F, maximum long-term temperature 110° F.
Moisture Condition	Dry concrete.
Type of Lightweight Concrete	N/A
Hole Drilling and Preparation	Hammer drill only.
 - 3. Installation of adhesive anchors into concrete that are either horizontal or upwardly inclined shall be performed only by personnel certified by the ACI/CRSI Adhesive Anchor Installation Certification Program.

3.4 EXPANSION, SCREW AND UNDERCUT ANCHORS

- A. Expansion, screw, and undercut anchors shall be installed using all procedures and accessory devices recommended by the anchor manufacturer.

End of Section

SECTION 10 99 00 - MISCELLANEOUS SPECIALTIES

PART 1 - GENERAL

1.1 SCOPE.

- A. This section covers the miscellaneous items of work not covered in other sections including:

1. Fire Extinguishers
2. Splash Blocks

1.2 GENERAL.

- A. Miscellaneous specialties shall be furnished and installed as specified herein and in accordance with the details, arrangements, and dimensions indicated on the Drawings. Where not specifically indicated or specified, fasteners, gaskets, and other accessories shall be provided as required and as recommended by the manufacturer of the specific item.

1.3 SUBMITTALS.

- A. Complete specifications, detailed drawings, and setting or erection drawings covering miscellaneous specialties shall be submitted in accordance with the Submittals Procedures section.

PART 2 - PRODUCTS

2.1 Fire Extinguishers.

- A. Portable fire extinguishers which are noted below to be UL-approved for Class C fires shall be provided as scheduled herein and where indicated on the Drawings. Class C fire extinguishers shall have a 10 pound capacity, such as Badger "B10V-1", Buckeye "10CD", or Kidde "Pro 10 CD" or approved equal. Finish of shell shall be red with all metal handle and valve. Class C fire extinguishers shall be mounted 42-inches above finish floor or as required by the NFPA. Wall lettering shall be included above all fire extinguisher locations.
- B. Surface mounted fire extinguisher cabinets shall be provided at the locations noted below. Surface mounted cabinets shall be Larsen "SS-2409-SM" with vertical duo clear acrylic door (stainless steel) or approved equal. Semi-recessed cabinets shall be Larsen "SS-2409-6R" with vertical duo clear acrylic door (stainless steel) or approved equal.

Miscellaneous Specialties

- C. Fire extinguishers shall be provided in accordance with the following schedule and as indicated on the Life Safety Plans in the Drawings:

Electrical Building

Room Location	Quantity	Mounting
Electrical Room (Class C)	2	Surface Cabinet

2.2 SPLASH BLOCKS.

- A. Precast reinforced concrete splash blocks shall be provided at the locations indicated on the Drawings.
- B. The block shall be approximately 16 inches wide by 30 inches long by 5 inches high with curbs on three sides. The splash portion shall be sloped from not less than 1-inch depth at the inlet end to not less than 2 inches at the outlet end. The block shall be reinforced with not less than WWF4X4-W4XW4 welded wire fabric.

PART 3 - EXECUTION

3.1 PROTECTION.

- A. All parts and assemblies shall be protected during fabrication, shipment, storage, and erection to prevent damage. Damaged units will be rejected and shall be replaced at no additional cost to the Owner.

End of Section

SECTION 13 14 00 - PREFABRICATED METAL BUILDING

PART 1 - GENERAL

1.1 SCOPE.

- A. This section covers freestanding, shop fabricated and assembled, steel building including fasteners, anchors, doors and frames, door hardware, and all gasketing necessary for a weather tight enclosure.
- B. Building HVAC equipment and electrical equipment (including lighting and outlets) shall be provided by the building manufacturer.

1.2 GENERAL.

- A. The prefabricated metal building design shall be as indicated on the Drawings and specified herein.
- B. The building shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with the Drawings, Specifications, engineering data, instructions, and recommendation of the building manufacturer, unless exceptions are noted by the Engineer.
- C. Design Requirements:
 - 1. Building size shall be as specified herein and shall be as indicated on the Drawings. The overall building footprint shall be finalized prior to pouring the associated concrete floor slab.
 - 2. Building shall be completely waterproof and corrosion resistant.
 - 3. Interior wall and roof surfaces shall include a liner panel completely enclosing and concealing the building structural framing and insulation.
 - 4. Design to sustain superimposed loads for load combinations in accordance with ASCE 7-10.-
 - 5. Building shall conform to the requirements of the 2018 North Carolina State Building Code:
- D. Building Dimensions:
 - 1. 20'-4" x 9'-0" interior dimensions
 - 2. 9'-6" interior minimum wall height.
- E. Design loads:
 - 1. Dead load of building.

Pre-Fabricated Metal Building

2. Roof Live Load – 20 psf
 3. Wind Load – As indicated in the Meteorological and Seismic Design Criteria section.
- F. Stresses produced by specified load conditions shall be determined consistent with recognized methods of analysis.
- G. A professional structural engineer, licensed to practice in the State of North Carolina, shall perform the structural design of the metal building. The design shall include stamped drawings and specifications to confirm compliance with the requirements of these specifications and to obtain all required local approvals and permits.
- H. Seismic design requirements shall be as indicated in the Meteorological and Seismic Design Criteria section.
- I. The building manufacturer shall coordinate all necessary wall and roof penetrations with the HVAC and electrical equipment scheduled to be installed in the building.
- J. The building manufacturer shall guarantee all building components against faulty or inadequate design, improper assembly or erection, defective workmanship or materials, and leakage, breakage, or other failure.
- 1.3 SUBMITTALS.
- A. All submittals shall be made in accordance with the Submittal Procedures section.
- B. The following items shall be submitted, as a minimum.
1. Manufacturer's information for all products supplied under this section, in the form of technical data sheets, certificates of compliance, test data, or reports.
 2. Door and door hardware manufacturer data sheets and construction information.
 3. Submit color samples for all building components requiring color selection, such as; wall panels, doors and frames, etc. Physical color samples will be required for color selection. Digital color charts and printed color charts will not be acceptable
- C. The following items shall be submitted bearing a seal by a Professional Engineer licensed in the state where the building will be erected. The seal shall be by a registered Structural Engineer if required by that state.
1. Calculations, including all dead, live, snow, wind, and seismic loads as specified in the Contract Documents.
 2. Complete drawings and data covering fabrication, layout, and installation Including plans, elevations, section depths and widths, location of openings and equipment supports, size and location of anchor bolts, wall/roof insulation values, and gasketing details.
 3. Fabrication drawings shall include:

Pre-Fabricated Metal Building

- a. All architectural features including, finishes, doors and gutters.
 - b. Connection locations, and any required accessories and hardware.
- 4. Erection drawings shall include:
 - a. Each individual piece mark, erection sequence, and details necessary to properly install the building.
 - b. Details indicating proper handling and erection, including all erection accessories and hardware.
 - c. Anchor details and locations.

1.4 QUALITY ASSURANCE.

- A. Building provided shall be end product of one manufacturer to achieve standardization for appearance.
- B. Manufacturer Qualifications: Building shall be manufactured and erected by firm with minimum of 15 years' experience in structures of size and character specified.

1.5 DELIVERY, STORAGE, AND HANDLING.

- A. Store and protect on manufacturer's site, project site and during shipment and installation to prevent warping and fracturing.
- B. Shrink-wrap the completed structure building components with protective plastic for shipment and storage at the job site.

PART 2 - PRODUCTS

2.1 MANUFACTURER.

- A. Porta-King, Panel Built, or approved equal.

2.2 BUILDING COMPONENTS.

- A. Structure:
 - 1. Prefabricated steel building shall be single unit welded construction. Building to be shipped completely assembled. All welded joints ground smooth.
- B. Walls:
 - 1. 16ga. Galvanized steel interior and exterior panels. Unit to have an exterior continuous layer of R-20 insulation as required to meet energy code compliance encapsulated within the final exterior layer of galvanized steel panels. Framing shall be cold drawn electro-welded structural mechanical steel frames.

Pre-Fabricated Metal Building

C. Base and Floor:

1. Unit to have no floor for drop-in installation over electrical equipment. Unit to have minimum four steel anchor clips. Exterior anchor clips required at west wall.

D. Roof:

1. Roof to be standard design for exterior use. Roof to be constructed of internal steel framing with 16-gauge galvanized steel roof deck with a SRI index of 64 or better, with R-38 insulation encapsulated within the final exterior layer of galvanized steel panels. Roof to drain to gutter and downspouts as indicated on the Drawings. Unit shall have removable lifting rings for hoisting by crane.

E. Doors:

1. Exterior personnel doors shall conform to the following requirements:

Doors & Frames	Flush aluminum doors; Special-Lite "SL-16", Cross "ThermaPlank FLT-400", Kawneer "Flushline", or approved equal. 1-3/4-inch thick door construction, embossed vertical ribbed aluminum face sheets .062-inch minimum thickness, manufacturer 10 year warranty. Polyisocyanurate rigid foam core or poured-in-place polyurethane core, maximum U-factor of U-0.37.
Single Door Size (101B)	3'-0" x 8'-6" door, 2-inch frame @ jambs and head.
Single Door Size (101A)	3'-0" x 7'-0" door, 2-inch frame @ jambs and head.

F. Door Hardware:

1. The door hardware shall conform to the following requirements:

Hinges	Full mortise, continuous hinges, flush-mounted, clear anodized aluminum.
Closers	Parallel arm, heavy duty, with delayed action and hold-open functions.
Lockset	Mortise locksets per Owner's security requirements.
Gasketing	Head and jamb perimeter weatherstripping with replaceable neoprene inserts.
Bottom Sweeps	Surface mounted with 1-inch brush.
Threshold	Thermal barrier saddle threshold, aluminum mill finish, 1/2-inch height x 4.5-inch depth.
Raindrip	2.5-inch projection, full length of door frame, aluminum mill finish.

2.3 ELECTRICAL.

A. Lighting Transformer

1. Separately mounted transformers shall be 480-208Y/120 Volt, 3-phase with kVA ratings as determined by supplier.

Pre-Fabricated Metal Building

2. Transformers shall be self air cooled, dry type, floor mounted, and enclosed for wiring in conduit.
3. Transformers shall meet DOE 10 CFR 431 guidelines for energy efficiency.

B. Lighting and Receptacles

1. Interior and exterior lighting and receptacles shall be supplied and installed by the vendor. A minimum of (4) 115V duplex receptacles, (1) 115V 20A single receptacle, (2) three-way wall switches, and (5) four feet wrap-around light fixtures shall be provided.
2. Standard duplex convenience outlets shall be , three-wire, grounding, 20 amperes, 125 volts, Eaton "AH5362V", Hubbell "5362I" or Leviton "5362 I" for 120 volt circuits, and 250 volts, Eaton "AH5462CV", Hubbell "5462I" or Leviton "5462-I" for 240 volt circuits.
3. Ground fault circuit interrupter receptacles shall be duplex, 20 amperes, 125 volts, Eaton "SGFH20", Hubbell "GFRST20I" or Leviton "G5362-I".
4. Switches on ac lighting panel load circuits through 277 volts shall be 20 amperes, 120/277 volts, Eaton "AH1221V" through "AH1224V", Hubbell "HBL 1221I" through "HBL 1224I", or Leviton "1221-2I" through "1224 2I".
5. Interior duplex receptacles shall be rated 120VAC, 20A, specification grade. Receptacles shall be located near each personnel door as well as one at the midpoint of the interior aisleway, as a minimum.
6. Exterior duplex receptacles shall be the same as interior type but shall include integral GFCI protection rated for outdoor applications and a weatherproof while in-use receptacle cover. Receptacles shall be located near each personnel door.
7. Electronic drivers furnished with LED type lighting fixtures shall be certified as meeting requirements of ANSI C82.77 with a THD level of not more than 20 percent.
8. Interior emergency lighting shall switch on automatically upon loss of AC power and provide 1.5 hours of continuous illumination, and then recharge when AC power is resumed.
9. Lighting fixture wall packs shall be mounted above/or beside each door.

C. Interior Wiring

1. All enclosure lighting and power wiring shall be single or multi conductor, stranded copper, with XHHW-2 600V insulation with a minimum size of No. 12 AWG. All wiring shall be installed in rigid aluminum conduits in accordance with the National Electric Code.
2. Wiring shall also include the HVAC system equipment, electrical devices such as receptacles, lighting and switchgear compartment heaters. HVAC equipment shall be furnished with local disconnect switch.

Pre-Fabricated Metal Building

3. Each enclosure shall be factory wired complete for proper operation of the distribution equipment and the AC power distribution.

D. Disconnect Switches

1. Unless otherwise specified, each disconnect switch shall be 3 pole, nonfusible, 600 volts, with a continuous current rating as required.
2. Fused switches shall be furnished complete with fuses as required. Fuse sizing shall be as indicated on the Drawings, as required by the results of the protective device study, or as recommended by the respective protected equipment manufacturer.
3. Switches located indoors shall have NEMA type enclosure designations as required by the locations where they will be installed. Switches located outdoors shall have NEMA Type 4X enclosures.
4. Switches shall have high conductivity copper, visible blades; nontearable, positive, quick make, quick break mechanisms; and switch assembly plus operating handle as an integral part of the enclosure base. Each switch shall have a handle whose position is easily recognizable and which can be locked in the "Off" position with three padlocks. The "On" and "Off" positions shall be clearly marked.
5. All switches shall be UL listed and horsepower [kilowatt] rated, and shall meet the latest edition of NEMA KS1. Switches shall have defeatable door interlocks that prevent the door from being opened while the operating handle is in the "On" position.

E. Lighting Panels

1. Each lighting panel shall be a dead front, 120/240 volt, single phase or 120/208 volt, three phase panelboard with circuit breakers, as required.
2. The panel shall have a flush-mounted or surface-mounted enclosure with a NEMA designation appropriate for the location where it will be installed. The enclosure shall have a hinged trim (cover). Breaker operating handles shall be accessible through a latched, lockable, door. At the completion of the Contract, a neatly printed or typed directory listing the panel and circuit identities shall be mounted inside the door.
3. Main circuit breaker shall be no greater than 40A.
4. Circuit breakers shall be thermal magnetic, bolt in, individually front replaceable, and shall indicate "On", "Off", and "Tripped". Breakers indicated as multiple pole shall be common trip. Breakers shall have interrupting ratings not less than 22,000 amperes. Handle clips to prevent casual operation of breakers shall be provided for 10 percent (at least two) of the breakers and applied to the circuits directed. Breakers and provisions for future breakers shall be provided in the quantities, number of poles, and ampere ratings as required.
5. As required, circuit breakers shall include arc-fault circuit interrupter (AFCI) and/or ground fault circuit interrupter (GFCI) protection functions as. GFCI breakers shall be configured for personnel protection with a ground fault trip threshold of 5 mA.

6. The panel shall have main and neutral buses insulated from the cabinet, and a ground bus. Buses shall be copper, with ampere ratings and main lugs or breaker as indicated. The ground bus shall be similar to a neutral bus and shall have a good ground connection to the cabinet, a removable bond to the neutral bus, clamp type lugs for the ground cable in each supply conduit, and connections for a ground cable in each load conduit

2.4 HVAC.

- A. The enclosure shall be provided with a HVAC system, sized and provided by the supplier, considering the ambient site conditions, the dimensions of the enclosure, the solar heating of the enclosure, and the heat generated by the equipment within the enclosure. All calculations shall be in accordance with the procedures listed in ANSI/ASHRAE/ACCA Standard 183. Heating and cooling load calculations shall be provided using an industry recognized software calculation program such as Elite CHVAC, Carrier Block Load or HAP or Trane Trace, The system shall be designed such that the sensible cooling capacity, not the total cooling capacity, will maintain an ambient temperature within the enclosure of between 55 degrees Fahrenheit winter and 80 degrees Fahrenheit summer, based on outdoor design temperatures of 95.1 Fdb/75.7 Fwb summer, and 20.3 Fdb winter. The unit shall be capable of maintaining the enclosure at a cooling temperature of 85 and a heating temperature of 60.
- B. The HVAC system shall not be designed for redundancy. The system shall consist of one unit sized to provide 100% of the load, based on the criteria described above. An alarm signal provision shall be provided to SCADA when the temperature within the prefabricated electrical enclosure has exceeded the high temperature limit. The system shall be provided with an electronic, automatic changeover thermostat. Power supply to the HVAC system shall be 208 - volt single phase.
- C. The unit shall be wall mounted on the enclosure as recommended by the enclosure supplier. The unit shall have appropriate anchorage, flashing, and sealant to provide a leakproof installation capable of withstanding the windspeed as required in the meteorological specification. The unit shall be completely factory tested and piped, internally wired, and fully charged with refrigerant.
- D. The HVAC unit shall come with hermetic compressor, multi-row copper tubing evaporator coil, condenser coil, electric heating coil, evaporator fan, factory-provided supply and return grilles, and condenser fan.
- E. The HVAC unit shall have a factory-built controller containing the necessary motor starters, selector switches, control power transformer, and fused safety disconnect switch and shall be rated for single point 208-volt, 60-Hz single-phase power connection.
- F. The wall mounted packaged air condition unit shall be manufactured by MarvAir "MAH", BARD "WA Series WALL-MOUNT", or equal.
- G. The unit shall be able to provide sensible cooling, total cooling, and heating that align with the calculations defined above. The unit shall come with an electric heating coil, lockable circuit breaker or disconnect switch, programmable thermostat with humidity control (digital humidistat), hot gas reheat, and a two inch thick MERV-8 replaceable air filter.

Pre-Fabricated Metal Building

- H. The unit shall operate on R-454B refrigerant or manufacturer's standard code compliant replacement for R-410A and compressor oil.
- I. The following controls shall be supplied: high pressure control, low pressure control, low ambient control, compressor anti-cycle relay, ASHRAE 15-approved refrigerant leak detection, and alarm relay. Suitable outside air shall be included for building pressurization. Cabinet, condenser and evaporator coils and all other air stream components shall be provided with coating suitable for an H2S laden atmosphere. Roof mounted HVAC equipment shall not be acceptable.
- J. The Contractor shall coordinate locations of HVAC equipment for the building with the interior equipment and any site space or access restrictions related to view, noise, parking etc. HVAC equipment shall be sized to provide uniform cooling at all places inside the room. Contractor shall coordinate the condensate disposal leading to a condensate drain sump.
- K. The contractor shall provide condensate drainage made of threaded galvanized steel, and shall terminate the drainage at a location that avoids nuisance buildup of water. The contractor shall provide a corrosion-resistant coating package "Marvair Coat-All" or equivalent, including corrosion resistant fasteners, coated condenser motor bracket and condenser fan, Insitu coating on the evaporator coil, all associated piping, all exterior and interior components and sheet metal, and on all exposed internal copper and metal in the condenser section, and a protective coating on the condenser coil.

2.5 FABRICATION.

- A. The unit shall be completely weather-tight. All seams and joints shall be pressure bonderized.
- B. Steel shall be coated with a rust inhibitive high build epoxy primer and two-part polyurethane finish coat. Paint colors to be selected by the Owner.

2.6 ASSEMBLY.

- A. Shop assemble complete building structural framing and wall/roof panels.

PART 3 - EXECUTION

3.1 EXAMINATION.

- A. Examine surface to receive building for acceptable installation conditions.
- B. Do not start installation unless acceptable conditions are provided.

3.2 INSTALLATION.

- A. Install the prefabricated enclosure on a flat and level concrete pad in accordance with the manufacturer's recommendations and placement drawings. Position units over utility stub-ups, verify building is level and anchor.

Pre-Fabricated Metal Building

- B. Repair damaged panels.

End of Section

This page intentionally left blank.

SECTION 26 05 11 - ELECTRICAL

PART 1 - GENERAL

1.1 SCOPE

- A. This section covers the furnishing and installation of all equipment and materials needed for the electrical requirements of this Contract. It also covers conduit, wiring, and terminations for electrical equipment installed under Electrical Equipment Installation section.
- B. This section covers the installation and interconnection of electrical equipment furnished under other sections, except electrical items designated to be installed under those sections.

1.2 GENERAL

- A. Electrical apparatus on all equipment shall be installed complete and placed in readiness for proper operation.
- B. Electrical materials furnished and installed under this section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with the Drawings, Specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by Engineer.
- C. General Equipment Stipulations
 - 1. The General Equipment Stipulations section shall apply to all equipment provided under this section. If requirements in this section differ from those in the General Equipment Stipulations section, the requirements specified herein shall take precedence
- D. Seismic Design Requirements
 - 1. Seismic design requirements for products specified herein shall be as indicated in the Meteorological and Seismic Design Criteria section.
- E. Coordination
 - 1. Electrical work shall conform to the construction schedule and the progress of other trades.
- F. Anchor Bolts and Expansion Anchors
 - 1. All anchor bolts, nuts, washers, and expansion anchors shall comply with Anchorage in Concrete and Masonry section, except smaller than 3/4 inch [19 mm] will be permitted to match NEMA standard size bolt holes on motors and electrical equipment.
- G. Drawings

Electrical

1. Supplementing this section, the Drawings indicate locations of equipment and enclosures and provide one-line and schematic diagrams regarding the connection and interaction with other equipment.

1.3 CODES AND PERMITS

- A. All work shall be performed and materials shall be furnished in accordance with the NEC - National Electrical Code, the NESC - National Electrical Safety Code, and the following standards where applicable:

AEIC	The Association of Edison Illuminating Companies
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
AWG	American Wire Gauge
Fed Spec	Federal Specification
ICEA	Insulated Cable Engineers Association
IEEE	Institute of Electrical and Electronics Engineers
IESNA	Illuminating Engineering Society of North America
NEIS	National Electrical Installation Standards
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
UL	Underwriters' Laboratories

- B. Equipment covered by this section shall be listed by UL, or by a nationally recognized third party testing laboratory. All costs associated with obtaining the listing shall be the responsibility of Contractor. If no third-party testing laboratory provides the required listing, an independent test shall be performed at Contractor's expense. Before the test is conducted, Contractor shall submit a copy of the testing procedure to be used.

1.4 SEISMIC DESIGN REQUIREMENT.

- A. Seismic Design Requirements

1. Submit confirmation of compliance with the requirements of the Meteorological and Seismic Design Criteria section.

1.5 IDENTIFICATION.

- A. Conduit

1. Conduits in building entrance pull boxes, junction boxes, and equipment shall be provided with identification tags. Identification tags shall be 19 gage stainless steel, with 1/2 inch stamped letters and numbers as indicated on the Drawings. Identification tags

shall be attached to conduits with nylon tie wraps and shall be positioned to be readily visible.

B. Conductors

1. All conductors in power, control, and instrumentation circuits shall be identified and color coded as described herein.
2. Conductor Identification Number
 - a. Except for lighting and receptacle circuits, each individual conductor in power, control, and instrumentation circuits shall be provided with wire identification markers at the point of termination.
 - b. The wire markers shall be of the self-laminating, write-on type.
 - c. The wire numbers shall be as indicated on the equipment manufacturer's drawings.
 - d. The wire markers shall be positioned to be readily visible for inspection.
3. Conductor Color Coding
 - a. Power conductors shall be color coded as indicated below. For conductors 6 AWG and smaller, the color coding shall be the insulation finish color. For sizes larger than 6 AWG, the color coding may be by marking tape. The equipment grounding conductor shall be green or green with one or more yellow stripes if the conductor is insulated.
 - b. The following color coding system shall be used:
 - 1) 120/240V single-phase — black, red, and white
 - 2) 120/208V, three-phase — black, red, blue, and white
 - 3) 120/240V, three-phase — black, orange, blue, and white
 - 4) 277/480V, three-phase — brown, orange, yellow, and gray
 - 5) 2400/4160V, three-phase — black, red, blue, and white
 - 6) 7200/12470V, three-phase — black, red, blue, and white
 - c. Where 120/240 and 120/208 volt systems share the same conduit or enclosure, the neutral for either the 120/240 volt system or the 208 volt system shall be white with a permanent identifiable violet stripe.
 - d. Control and instrumentation circuit conductors shall be color coded as indicated in the Cable Data Figures at the end of this section.

C. Motor Starters

1. Motor starters shall be provided with nameplates identifying the related equipment. Pilot controls and indicating lights shall have engraved or etched legends ("start", "stop", etc.) as indicated on the Drawings. Nameplates shall be laminated black-over-white plastic, with 1/8 inch engraved letters, and shall be securely fastened to the motor starters.

D. Control Stations

E. Not used.

F.

G. Circuit Breakers

1. Circuit breakers shall be provided with nameplates identifying related equipment. Nameplates shall be laminated black-over-white plastic, with 1/8 inch engraved letters, and shall be securely fastened to the circuit breakers.

H. Disconnect Switches

1. All switches shall have front cover-mounted permanent nameplates that include switch type, manufacturer's name and catalog number, and rating. An additional nameplate, engraved or etched, laminated black-over-white plastic, with 1/8 inch letters, shall be provided to identify the associated equipment. Both nameplates shall be securely fastened to the enclosure.

I. Arc Flash Hazard Labels

1. Lighting panels, power panels, power centers, switchgear, switchboards, motor control centers, motor control line ups, transfer switches, industrial control panels, adjustable frequency drives, fused switches, meter socket enclosures, and other electrical equipment likely to be worked on energized shall be provided with permanent labels warning the risk of arc flash and shock hazard. Labels shall be designed in accordance with ANSI Z535.4 and shall include the following:

WARNING
Arc Flash and Shock Hazard

Appropriate personal protection equipment (PPE) required. SEE NFPA 70E. Equipment must be accessed by qualified personnel only.
Turn off all power sources prior to working on or inside equipment.

2. Additional information shall be provided on the labels where specified in the Arc Flash Hazard Analysis section of this section.

1.6 SUBMITTALS

A. Drawings and Data – General

1. Complete assembly, foundation, and installation drawings, together with complete engineering data covering the materials used, parts, devices, and accessories forming a part of the work performed by the Contractor, shall be submitted in accordance with the Submittal Procedures section. The drawings and data shall include, but shall not be limited to, the following:
 - a. Drawings and data.
 - b. Operating manuals.
 - c. Samples.
 - d. Test reports
 - e. Studies

B. Submittal Details & Identification

Electrical

1. Information covering all materials and equipment shall be submitted for review in accordance with the Submittal Procedures section. Each sheet of descriptive literature submitted shall be clearly marked to identify the material or equipment as follows:
 - a. Lamp fixture descriptive sheets shall show the fixture schedule letter, number, or symbol for which the sheet applies.
 - b. Equipment and materials descriptive literature and drawings shall show the specification paragraph for which the equipment applies.
 - c. Sheets or drawings covering more than the item being considered shall have all inapplicable information crossed out.
 - d. A suitable notation shall identify equipment and materials descriptive literature not readily cross-referenced with the Drawings or Specifications.
 - e. Schematics and connection diagrams for all electrical equipment shall be submitted for review. A manufacturer's standard connection diagram or schematic showing more than one scheme of connection will not be accepted, unless it is clearly marked to show the intended connections.
 - f. Surge protective device submittals shall include drawings (including unit dimensions, weights, component and connection locations, mounting provisions, and wiring diagrams), equipment manuals that detail the installation, operation and maintenance instructions for the specified unit(s), and manufacturer's descriptive bulletins and product sheets.

C. Engineering and Testing Firm

1. Contractor shall submit the name and qualifications of the Engineering and Testing Services firm proposed to perform the protective device study and the on-site testing.

D. Cable and Conduit Submittal

1. Within 90 days after the Notice to Proceed, Contractor shall furnish a submittal for all types of cable and conduit to be provided. The submittal shall include the cable manufacturer and type, and sufficient data to indicate that the cable and conduit meet the specified requirements.

E. Cable Samples

1. In addition to the complete specifications and descriptive literature, a sample of the largest size of each type of cable shall be submitted for review before installation. Each sample shall include legible and complete surface printing of the cable identification.

F. Seismic Design Requirements

1. Submitted confirmation of compliance with the requirements of the Meteorological and Seismic Design Criteria section.

1.7 PROTECTION AND STORAGE

- A. During construction, the insulation on all electrical equipment shall be protected against absorption of moisture, and metallic components shall be protected against corrosion by strip

Electrical

heaters, lamps, or other suitable means. This protection shall be provided immediately upon receipt of the equipment and shall be maintained continuously.

PART 2 - PRODUCTS

2.1 POWER SERVICE ENTRANCE

- A. Not used.

2.2 TELEPHONE SERVICE ENTRANCE

- A. Not used.

2.3 CABLE

- A. All cables of each type (such as lighting cable or 600 volt power cable) shall be from the same manufacturer.

- B. All types of cable shall conform to the Cable Data Figures at the end of this section and as described herein.

- C. Lighting Cable

- 1. Lighting cable (Figure 1-26 0511 THHN-THWN-2) shall be provided only in lighting and receptacle circuits operating at 277 volts or less. Lighting and receptacle circuits, 8 AWG or larger, shall be as specified for 600 volt (Figure 2-26 0511 XHHW-2) power cable.

- D. 600 Volt Power Cable

- 1. Cable in power, control, indication, and alarm circuits operating at 600 volts or less, except where lighting, multiconductor control, and instrument cables are required, shall be 600 volt (Figure 2-26 0511 XHHW-2) power cable.

- E. Instrument Cable

- 1. Cable for electronic circuits to instrumentation, metering, and other signaling and control equipment shall be two-conductor instrument cable twisted for magnetic noise rejection and protected from electrostatic noise by a total coverage shield. Types of instrument cables shall be (Figure 4-26 0511 single pair).

- F. Multiconductor Control Cable

- G. Not used.

- H. Medium Voltage Power Cable

Electrical

Not Used.

I. Tray Cable

J. Not Used.

K. Metal Clad Lighting Cable

L. Not used.

2.4 RACEWAY

A. Conduit and cable tray shall be as described in the following paragraphs:

B. Rigid Steel Conduit

Not Used.

C. Intermediate Metal Conduit (IMC)

Not Used.

D. Liquidtight Flexible Metal Conduit

Not Used.

E. Utility (PVC) Duct

Not Used.

F. Rigid Nonmetallic (PVC) Conduit

Not Used.

G. PVC-Coated Rigid Steel Conduit

Not Used.

H. Electrical Metallic Tubing (EMT)

Not Used.

I. Rigid Aluminum Conduit (RAC)

1. Rigid aluminum conduit and fittings shall be manufactured of 6063-T1 alloy, shall conform to ANSI C80.5, and shall be manufactured in accordance with UL 6A.

J. Cable Tray

K. Not used.

2.5 WIRING DEVICES, BOXES, AND FITTINGS

- A. Concealed conduit systems shall have flush-mounted switches and convenience outlets. Exposed conduit systems shall have surface-mounted switches and convenience outlets.
- B. Conduit Boxes and Fittings
 - 1. Galvanized or cadmium plated, threaded, malleable iron boxes and fittings shall be manufactured by Crouse-Hinds, Appleton, or O Z Gedney. In applications utilizing aluminum conduit systems, aluminum boxes and fittings manufactured by Crouse-Hinds, Appleton, or O Z Gedney shall be installed.
 - 2. Rigid PVC device boxes and fittings shall be manufactured by Carlon or Cantex.
 - 3. Sheet steel device boxes shall be manufactured by Appleton, Raco, or Steel City.
 - 4. PVC coated device boxes shall be manufactured by Calbond, Ocal, or Robroy Industries. Where used in hazardous locations, PVC coated fittings and boxes shall be UL 1203 listed.
 - 5. Hub arrangements on threaded fittings shall be the most appropriate for the conduit arrangement to avoid unnecessary bends and fittings.
 - 6. Fittings for liquid-tight flexible conduit shall be listed or comply with UL 514B and meet NEMA FB1 standards.
- C. Device Plates.
 - 1. Galvanized or cadmium-plated device plates shall be used on surface mounted outlet boxes where weatherproof plates are not required.
 - 2. Device plates on flush mounted outlet boxes where weatherproof plates are not required shall be AISI Type 302 stainless steel, Eaton "93000 series", Hubbell "S series", or Leviton "840nn-40 series"; nylon or polycarbonate, Eaton "5000 series", Hubbell "Pn series", or Leviton "807nn-I series".
 - 3. Device plate mounting hardware shall be countersunk and finished to match the plate.
 - 4. Device plates for switches outdoors or indicated as weatherproof shall have provisions for padlocking switches "On" and "Off", and shall be Appleton "FSK-1VS", Crouse-Hinds "DS185" or O Z Gedney "FS-1-WSCA".
 - 5. Device plates for receptacles indicated as weatherproof shall be Appleton "FSK WRD", Crouse Hinds "WLRD1", or O Z Gedney "FS 1 WDCA".
 - 6. Flush-mounted, weatherproof plates shall be provided with adapter plates, Appleton "FSK-SBA" or Crouse-Hinds "FS031".
 - 7. Device plates for ground fault interrupter receptacles indicated to be weatherproof shall be Appleton "FSK-WGFI", Eaton "S966", or O Z Gedney "FS-1-GFCA".

Electrical

8. Receptacle covers outdoors or otherwise indicated to be weatherproof while in-use shall be die cast aluminum and shall include a padlock eye. Covers for standard convenience outlets shall be Hubbell "WP8M" or Thomas and Betts Red Dot "CKMUV". Covers for ground fault interrupter receptacles shall be Hubbell "WP26M" or Thomas and Betts Red Dot "CKMUV".
9. Engraved device plates, where required, shall be manufactured by Leviton, or equal.
10. Device plates on PVC conduit fittings shall be Carlon "E98 Series" or Cantex "513300 Series".

D. Wall Switches

1. Wall Switches for the Prefabricated Metal Building shall be provided by the building supplier, and shall be as specified as in 13 14 00.

E. Receptacles

1. Receptacles for the Prefabricated Metal Building shall be provided by the building supplier, and shall be as specified as in 13 14 00.

F. Special Outlets

G. Not used.

2.6 JUNCTION BOXES, PULL BOXES, AND WIRING GUTTERS

- A. Indoor boxes (larger than switch, receptacle, or fixture type) and gutters shall be constructed of sheet steel, shall be galvanized after fabrication, and shall be rigidly supported by hot-dip galvanized hardware and framing materials, including nuts and bolts.
- B. Bolt-on junction box covers 3 feet square or larger, or heavier than 25 lbs, shall have rigid handles. Covers larger than 3 by 4 feet shall be split.

2.7 LIGHTING FIXTURES

- A. Lighting Fixtures for the Prefabricated Metal Building shall be provided by the building supplier, and shall be as specified as in 13 14 00.

2.8 LIGHTING PANELS

- A. Each lighting panel shall be a dead-front, 120/240 volt, single phase or 120/208 volt, three phase panelboard with circuit breakers, in accordance with the Drawings and the following:
- B. Cabinet
 1. The panel shall have a flush-mounted or surface-mounted enclosure with a NEMA designation appropriate for the location where it will be installed. The enclosure shall

have a hinged trim (cover). Breaker operating handles shall be accessible through a latched, lockable, door. At the completion of the Contract, a neatly printed or typed directory listing the panel and circuit identities shall be mounted inside the door.

C. Circuit Breakers

1. Circuit breakers shall be thermal-magnetic, bolt-in, individually front replaceable, and shall indicate "On", "Off", and "Tripped". Breakers indicated as multiple-pole shall be common trip. Breakers shall have interrupting ratings not less than 22,000 amperes. Handle clips to prevent casual operation of breakers shall be provided for 10 percent (at least two) of the breakers and applied to the circuits directed. Breakers and provisions for future breakers shall be provided in the quantities, number of poles, and ampere ratings indicated on the Drawings.
2. Where indicated on the Drawings, circuit breakers shall include arc-fault circuit interrupter (AFCI) and/or ground fault circuit interrupter (GFCI) protection functions. Where GFCI breakers dedicated to protect heat tracing circuits, GFCI breakers shall be configured for equipment protection with a ground fault trip threshold of 30 mA. Otherwise, GFCI breakers shall be configured for personnel protection with a ground fault trip threshold of 5 mA.

D. Buses

1. The panel shall have main and neutral buses insulated from the cabinet, and a ground bus. Buses shall be copper, with ampere ratings and main lugs or breaker as indicated. The ground bus shall be similar to a neutral bus and shall have a good ground connection to the cabinet, a removable bond to the neutral bus, clamp type lugs for the ground cable in each supply conduit, and connections for a ground cable in each load conduit.

2.9 POWER PANELS

Not used.

2.10 SURGE PROTECTIVE DEVICES

A. Scope

1. Surge protective devices (SPD) shall be provided as specified herein and as indicated on the Drawings. Each unit shall be designed for parallel connection to the wiring system and shall utilize non-linear voltage-dependent metal oxide varistors (MOV) in parallel.
2. Each SPD shall be furnished and installed for the electrical equipment indicated on the Drawings or as specified herein. All new lighting and power panels shall be furnished with an integral SPD.
3. Lighting panels shall be rated for the low exposure level capacity unless otherwise noted.

4. The table below lists the specific SPD ratings for new lighting panels.

Panel Name	Location	Voltage/ Phase	Exposure Level
LP-L4B	Electrical Enclosure	208V/3 phase, 4W	Low
LP-L5B	Electrical Enclosure	208V/3 phase, 4W	Low
LP-L6B	Electrical Enclosure	208V/3 phase, 4W	Low

B. Standards

1. The specified unit shall be designed, manufactured, tested and installed in compliance with the following standards:
 - a. ANSI/IEEE C62.41 and C62.45;
 - b. ANSI/IEEE C62.1 and C62.11;
 - c. IEEE C62.62;
 - d. National Electrical Manufacturers Association (NEMA LS1 Guidelines);
 - e. National Fire Protection Association (NFPA 20, 70 [NEC], 75, and 780);
 - f. Underwriters Laboratories UL 1449 and 1283
2. The unit shall be UL 1449 Listed as a Type 2 Surge Protective Device and UL 1283 Listed as an Electromagnetic Interference (EMI) Filter.

C. Environmental Requirements

1. Operating Temperature: 0°F to +140°F .
2. Relative Humidity: Reliable operation with 5 percent to 95 percent non-condensing.

D. Electrical Requirements

1. Unit Operating Voltage. The nominal unit operating voltage and configuration shall be as indicated on the Drawings.
2. Maximum Continuous Operating Voltage (MCOV). The SPD shall be designed to withstand a MCOV of not less than 115 percent of nominal RMS voltage.
3. Operating Frequency. Operating frequency range shall be 47 to 63 Hertz.
4. Protection Modes. Four-wire configured systems shall provide, Line-to-Neutral (L-N), Line-to-Ground (L-G), and Neutral-to-Ground (N-G), and Line-to-Line (L-L) protection. Three-wire configured systems shall provide, Line-to-Line (L-L) protection and Line-to-Ground (L-G) protection.

Electrical

5. Rated Single Pulse Surge Current Capacity. The rated single pulse surge current capacity, in amps, for each mode of protection of the unit shall be as required and shall be no less than listed in the following table.

	L-N	L-G	N-G	L-L
High Exposure Level	120 kA	120 kA	120 kA	120 kA
Medium-High Exposure Level	100 kA	100 kA	100 kA	100 kA
Medium Exposure Level	80 kA	80 kA	80 kA	80 kA
Low Exposure Level	60 kA	60 kA	40 kA	60 kA

6. UL 1449 Voltage Protection Rating (VPR). The maximum VPR per mode for the device (inclusive of disconnect) shall be as required and shall not exceed the following:

Voltage	L-N	L-G	N-G	L-L
120/208 3-phase	800 V	800 V	800 V	1200 V
480 V 3W		1200 V		2000 V]

7. Noise Attenuation. The unit shall be capable of a minimum -30 dB attenuation at 100kHz when tested per the 50 ohm insertion loss method as defined by MIL-STD-220C.
8. Nominal Discharge Current. Each SPD shall have a nominal discharge current rating of 20 kA.
9. Overcurrent Protection. At high and medium-high exposure levels, the SPD shall incorporate internal fusing capable of interrupting, at minimum, up to 200 kA symmetrical fault current with 600 volts ac applied.

At medium and low exposure levels, the SPD shall incorporate internal fusing capable of interrupting, at minimum, up to 65kA symmetrical fault current with 600 volts ac applied.

The device shall be capable of allowing passage of the rated maximum surge current for every mode without fuse operation.

10. Unit Status Indicators. The unit shall include long-life, externally visible phase indicators that monitor the on-line status of the unit. When furnished integral to the panelboard, the status indicators shall be viewable when the panelboard door is opened.

E. Installation

1. Each SPD shall be installed according to the manufacturer's recommendations. If possible for the integral units, provide direct bus connections.

F. Miscellaneous

1. Disconnect Switch. Each SPD shall be furnished with an integral disconnect switch. The unit shall be UL 1449 listed as such, and the UL 1449 Voltage Protection Ratings shall be provided. The disconnect switch shall be fused and capable of withstanding, without

Electrical

failure, the published maximum surge current magnitude without failure or damage to the switch.

2. Enclosure. For the SPD units to be mounted externally of the protected electrical equipment, provide NEMA rated enclosures suitable for the locations indicated on the Drawings.
3. Dual Form "C" Dry Contacts. The SPD shall be provided with a set of form "C" dry contacts (normally open and normally closed) to facilitate connection to a plant control system or other remote monitoring system. The contacts shall be normally open or normally closed and shall change state upon any alarm condition.

G. Acceptable Manufacturers

1. Integral SPD's shall be manufactured by Eaton, General Electric, or Schneider-Electric. External SPD's shall be manufactured by Eaton, General Electric, Siemens Energy & Automation, Schneider-Electric, or Current Technology. The products of other manufacturers will not be acceptable.

2.11 SEPARATELY ENCLOSED MOTOR STARTERS

- A. Not used.

2.12 SEPARATELY ENCLOSED MANUAL STARTERS

- A. Not used.

2.13 CONTROL STATIONS

- A. Not Used.

2.14 SEPARATELY ENCLOSED CIRCUIT BREAKERS

- A. Not used.

2.15 DISCONNECT SWITCHES

- A. Not used.

2.16 LIGHTING AND AUXILIARY POWER TRANSFORMERS

- A. Separately mounted transformers shall be provided in the phases, kVA, and voltages indicated on the Drawings. Transformers shall be self-air-cooled, dry type, wall- or floor-mounted, and enclosed for wiring in conduit. Transformers installed outdoors shall be weatherproof.

Electrical

Transformers shall have at least four full capacity voltage taps, two above and two below rated voltage. Transformers shall meet DOE 10 CFR 431 guidelines for energy efficiency.

2.17 POWER CENTERS

- A. Not used.

2.18 POWER FACTOR CORRECTION CAPACITORS

- A. Not used.

2.19 LIGHTING CONTACTORS

- A. Not used.

2.20 PHOTOELECTRIC CONTROLS

- A. Not used.

2.21 RELAY ENCLOSURES

- A. Not Used.

2.22 ALARM HORN AND BEACON

- A. Not used.

2.23 HEAT-TRACED PIPING

- A. Not used.

2.24 DOOR ENTRY SWITCHES

- A. Not used.

PART 3 - EXECUTION

3.1 INSTALLATION, TESTING, AND COMMISSIONING

- A. All material, equipment, and components specified herein shall be installed, tested, and commissioned for operation in compliance with NECA 1000 – NEIS Specification System.

Electrical

Where required in NECA 1000, testing and commissioning procedures shall be followed prior to energizing equipment.

3.2 ARC FLASH HAZARD ANALYSIS

- A. Not used.

3.3 PROTECTIVE DEVICE STUDY

- A. Not used.

3.4 POWER AND SERVICE ENTRANCE INSTALLATION

- A. Not used.

3.5 TELECOMMUNICATIONS SERVICE ENTRANCE INSTALLATION

- A. Not used.

3.6 CABLE INSTALLATION

- A. Except as otherwise specified or indicated on the Drawings, cable shall be installed according to the following procedures, taking care to protect the cable and to avoid kinking the conductors, cutting or puncturing the jacket, contamination by oil or grease, or any other damage. Circuits to supply electric power and control to equipment and devices, communication and signal circuits as indicated on the one-line diagrams shall be installed continuous and may not be spliced unless approved by the Engineer.
 - 1. Stranded conductor cable shall be terminated by lugs or pressure type connectors. Wrapping stranded cables around screw type terminals is not acceptable.
 - 2. Stranded conductor cable shall be spliced by crimp type connectors. Twist-on wire connectors may only be used for splicing solid cable and for terminations at lighting fixtures.
 - 3. Cable terminations and splices shall be made as recommended by the cable manufacturer for the particular cable and service conditions.
 - 4. Cable shall not be pulled tight against bushings nor pressed heavily against enclosures.
 - 5. Cable-pulling lubricant shall be compatible with all cable jackets; shall not contain wax, grease, or silicone; and shall be Polywater "Type J".
 - 6. Cables operating at more than 2000 volts shall be fireproofed in all cable vaults, manholes, and handholes. Fireproofing shall be applied with a half-lapped layer of 3M

"Scotch 77 Arc-Proofing Tape", anchored at each end with a double wrap of 3M "Scotch 69 Glass Cloth Tape" or with equivalent tape by Anixter or Plymouth/Bishop.

7. Where necessary to prevent heavy loading on cable connections, in vertical risers, the cable shall be supported by Kellems, or equal, woven grips.
8. Cables shall not be bent to a radius less than the minimum recommended by the manufacturer. For cables rated higher than 600 volts, the minimum radius shall be 8 diameters for nonshielded cable and 12 diameters for shielded cable.
9. All cables in one conduit, over 1 foot long, or with any bends, shall be pulled in or out simultaneously.
10. Circuits to supply electric power and control to equipment and devices are indicated on the one-line diagrams. Conductors in designated numbers and sizes shall be installed in conduit of designated size. Circuits shall not be combined to reduce conduit requirements unless acceptable to Engineer.
11. Instrument cable shields and drain wires shall be continuous over the entire length of the circuit and grounded at one end only. In general, the field end of the shield shall be ungrounded. At the ungrounded termination of the circuit, the shield and drain wire shall be insulated by taping to prevent grounding.
12. Cables operating at more than 2,000 volts which terminate at medium-voltage padmounted equipment bushings shall include a metal oxide varistor surge protective elbow terminator conforming to IEEE Standard 386. Elbows shall provide a weatherproof, dead-front, hot-stick operable separable connection. Surge protector rating shall be as recommended by the terminator supplier.
13. Cable terminations shall be tightened to the torque values specified by the equipment manufacturer. Where such values are not available, conductor terminations shall be firmly tightened in accordance with accepted industry practice.

B. Underground Cable Pulling Procedure

1. Care shall be taken to prevent excessive physical stresses that would cause mechanical damage to cables during pulling.

C. Medium-Voltage Cable Insulation Test

Not used.

3.7 RACEWAY INSTALLATION

- A. Contractor shall be responsible for routing all raceway. This shall include all conduits indicated on the one-lines, riser diagrams, and home-runs shown on the plan Drawings. Conduits shall be routed as defined in these Specifications. Where conduit routing is shown on plans, it shall be considered a general guideline and shall be field verified to avoid interferences.

- B. Except as otherwise specified or indicated on the Drawings, conduit installation and identification shall be completed according to the following procedures.
- C. Installation of Interior and Exposed Exterior Conduit
 - 1. This section covers the installation of conduit inside structures, above and below grade, and in exposed outdoor locations. In general, conduit inside structures shall be concealed. Large conduit and conduit stubs may be exposed unless otherwise specified or indicated on the Drawings. No conduit shall be exposed in water chambers unless so indicated on the Drawings.
 - 2. Unless otherwise indicated on the Drawings, Contractor shall be responsible for routing the conduit to meet the following installation requirements:
 - a. Conduit installed in all exposed indoor locations, except corrosive areas indicated on the Drawings, and in floor slabs, walls, and ceilings of hazardous (classified) locations, shall be rigid aluminum. Exposed conduits shall be rigidly supported by stainless steel hardware and framing materials, including nuts and bolts.
 - b. Conduit installed in floor slabs and walls in non-hazardous locations shall be rigid Schedule 40 PVC.
 - c. Conduit installed in all exposed outdoor locations shall be rigid aluminum, rigidly supported by stainless steel framing materials. Mounting hardware, which includes nuts, bolts, and anchors, shall be stainless steel.
 - d. Final connections to dry type transformers, to motors without flexible cords, and to other equipment with rotating or moving parts shall be liquidtight flexible metal conduit with watertight connectors installed without sharp bends and in the minimum lengths required for the application, but not longer than 6 feet unless otherwise acceptable to Engineer.
 - e. Terminations and connections of rigid metal conduit shall be taper threaded. Conduits shall be reamed free of burrs and shall be terminated with conduit bushings.
 - f. Exposed conduit shall be installed either parallel or perpendicular to structural members and surfaces.
 - g. Two or more conduits in the same general routing shall be parallel, with symmetrical bends.
 - h. Conduits shall be at least 6 inches from high temperature piping, ducts, and flues.
 - j. Rigid Schedule 40 and 80 PVC conduit shall have supports and provisions for expansion as required by NEC Article 352.
 - k. Metallic conduit connections to sheet metal enclosures shall be securely fastened by locknuts inside and outside.

- l. Rigid Schedule 40 and 80 PVC conduit shall be secured to sheet metal device boxes using a male terminal adapter with a locknut inside or by using a box adapter inserted through the knockout and cemented into a coupling.
- m. Conduits in walls or slabs, which have reinforcement in both faces, shall be installed between the reinforcing steel. In slabs with only a single layer of reinforcing steel, conduits shall be placed under the reinforcement. Conduits larger than 1/3 of the slab thickness shall be concrete encased under the slab.
- n. Conduits that cross structural joints where structural movement is allowed shall be fitted with concrete tight and watertight expansion/deflection couplings, suitable for use with metallic conduits and rigid Schedule 40 or 80 PVC conduits. The couplings shall be Appleton Type DF, Crouse-Hinds Type XD, or O-Z Type DX.
- o. Conduit shall be clear of structural openings and indicated future openings.
- p. Conduits through roofs or metal walls shall be flashed and sealed watertight.
- q. Conduit installed through any openings cut into non-fire rated concrete or masonry structure elements shall be neatly grouted. Conduit penetrations of fire rated structure elements shall be sealed in a manner that maintains the fire rating as indicated on the Architectural Drawings.
- r. Conduits shall be capped during construction to prevent entrance of dirt, trash, and water.
- s. Exposed conduit stubs for future use shall be terminated with galvanized pipe caps.
- t. Concealed conduit for future use shall be terminated in equipment or fitted with couplings plugged flush with structural surfaces.
- u. Where the Drawings indicate future duplication of equipment wired hereunder, concealed portions of conduits for future equipment shall be provided.
- v. Horizontal conduit shall be installed to allow at least 7 feet of headroom, except along structures, piping, and equipment or in other areas where headroom cannot be maintained.
- w. Conduit shall not be routed across the surface of a floor, roof, or walkway unless approved by Engineer.
- x. All conduits that enter enclosures shall be terminated with acceptable fittings that will not affect the NEMA rating of the enclosure.
- y. Conduit which turns out of concrete slabs or walls, shall be connected to a 90-degree elbow of PVC-coated rigid steel or aluminum conduit before it emerges. Conduits shall have a matching PVC-coated rigid coupling embedded a minimum of 3 inches when emerging from slabs or walls and the

coupling shall extend 2 inches from the wall.

D. Underground Conduit Installation

E. Not used.

F. Sealing of Conduits

1. After cable has been installed and connected, conduit ends shall be sealed by forcing nonhardening sealing compound into the conduits to a depth at least equal to the conduit diameter. This method shall be used for sealing all conduits at handholes, manholes, and building entrance junction boxes, and for 1 inch and larger conduit connections to equipment.
2. Conduits entering chlorine feed and storage rooms shall be sealed in a junction box or conduit body adjacent to the point of entrance.
3. Conduits entering hazardous (classified) areas and submersible or explosion proof enclosures shall have Appleton "Type ESU" or Crouse-Hinds "EYS" sealing fittings with sealing compound.

G. Reuse of Existing Conduits

1. Existing conduits may be reused subject to the concurrence of Engineer and compliance with the following requirements:
 - a. A wire brush shall be pulled through the conduit to remove any loose debris.
 - b. A mandrel shall be pulled through the conduit to remove sharp edges and burrs.

H. Cable Tray Installation

I. Not used.

3.8 WIRING DEVICES, BOXES, AND FITTINGS INSTALLATION

A. Metallic and nonmetallic conduit boxes and fittings shall be installed in the following locations:

B. Conduit Boxes and Fittings

1. Galvanized or cadmium plated, threaded, malleable iron boxes and fittings shall be installed in concrete walls, ceilings, and floors; in the outdoor faces of masonry walls; and in all locations where weatherproof device covers are required. These boxes and fittings shall also be installed in exposed rigid steel and intermediate metal conduit systems.
2. Galvanized or cadmium plated sheet steel boxes shall be installed in the indoor faces of masonry walls, in interior partition walls, and in joist supported ceilings.

Electrical

3. Aluminum device boxes shall be installed in exposed rigid aluminum conduit systems.
4. Rigid PVC device boxes shall be installed in exposed nonmetallic conduit systems.
5. PVC coated boxes and fittings shall be installed in PVC coated conduit systems.
6. Telephone conduit shall be provided with separate junction boxes and pull fittings.

C. Device Plates

1. Oversized plates shall be installed where standard-sized plates do not fully cover the wall opening.

D. Wall Switches

1. Wall switches shall be mounted 3'-6" above floor or grade.
2. After circuits are energized, all wall switches shall be tested for proper operation.

E. Receptacles

1. Convenience outlets shall be 18 inches above the floor unless otherwise required.
2. Convenience outlets outdoors and in garages; in basements, shops, storerooms, and rooms where equipment may be hosed down; shall be 4 feet above floor or grade.
3. Welding receptacles shall be surface-mounted 4 feet above the floor.
4. After circuits are energized, each receptacle shall be tested for correct polarity and each GFCI receptacle shall be tested for proper operation.
5. Conduit and wire for convenience outlet installation is not shown on the Drawings and shall be sized, furnished, and installed by Contractor. Conductors shall be minimum 12 AWG and conduit shall be minimum 3/4 inch for convenience outlet installation.

F. Special Outlets

1. Wall thermostats shall be 4'-6" above the floor unless otherwise required. Thermostats on exterior walls shall be suitably insulated from wall temperature.

3.9 EQUIPMENT INSTALLATION

- A. Except as otherwise specified or indicated on the Drawings, the following procedures shall be used in performing electrical work.

B. Setting of Equipment

1. All equipment, boxes, and gutters shall be installed level and plumb. Boxes, equipment enclosures, metal raceways, and similar items mounted on water- or earth-bearing walls shall be separated from the wall by at least 1/4 inch thick corrosion-resistant spacers.

Where boxes, enclosures, and raceways are installed at locations where walls are not suitable or available for mounting, concrete equipment pads, framing material, and associated hardware shall be provided.

C. Sealing of Equipment

1. All outdoor substation, switchgear, motor control center, and similar equipment shall be permanently sealed at the base, and all openings into equipment shall be screened or sealed with concrete grout to keep out rodents and insects the size of wasps and mud daubers. Small cracks and openings shall be sealed from inside with silicone sealant, Dow-Corning "795" or General Electric "SCS1200".

3.10 GROUNDING

A. General

1. The electrical system and equipment shall be grounded in compliance with the National Electrical Code and the following requirements:
 - a. All ground conductors shall be at least 12 AWG soft drawn copper cable or bar, bare or green-insulated in accordance with the National Electrical Code.
 - b. Ground cable splices and joints, ground rod connections, and equipment bonding connections shall meet the requirements of IEEE 837, and shall be exothermic weld connections or irreversible high-compression connections, Cadweld "Exothermic" or Burndy "Hyground". Mechanical connectors will not be acceptable. Cable connections to bus bars shall be made with high-compression two-hole lugs.
 - c. Ground cable through exterior building walls shall enter within 3 feet below finished grade and shall be provided with a water stop. Unless otherwise indicated, installation of the water stop shall include filling the space between the strands with solder and soldering a 12 inch copper disc over the cable. The copper disc shall be installed on the exterior of the wall and shall be a minimum thickness of 12 gauge and have a diameter that is a minimum of 2 inch larger than the diameter of the core hole that the ground cable passes through. The copper disc shall be soldered to the ground cable and caulk shall be applied around the outside edge of the copper disc where it adjoins the exterior wall. Caulk rated for submerged application shall comply with the Joint Sealants section.
 - d. Ground cable near the base of a structure shall be installed in earth and as far from the structure as the excavation permits, but not closer than 24 inches. The tops of ground rods and ground cable interconnecting ground rods shall be buried a minimum of 30 inches below grade, or below the frost line, whichever is deeper.
 - e. All powered equipment, including lighting fixtures and receptacles, shall be grounded by a copper ground conductor in addition to the conduit connection.

- f. Ground connections to equipment and ground buses shall be made with copper or high conductivity copper alloy ground lugs or clamps. Connections to enclosures not provided with ground buses or ground terminals shall be made with irreversible high-compression type lugs inserted under permanent assembly bolts or under new bolts drilled and inserted through enclosures, other than explosion proof enclosures, or by grounding locknuts or bushings. Ground cable connections to anchor bolts; against gaskets, paint, or varnish; or on bolts holding removable access covers will not be acceptable.
- g. The grounding system shall be bonded to the station piping by connecting to the first flange inside the building, on either a suction or discharge pipe, with a copper bar or strap. The flange shall be drilled and tapped to provide a bolted connection.
- h. Ground conductors shall be routed as directly as possible, avoiding unnecessary bends. Ground conductor installations for equipment ground connections to the grounding system shall have turns with minimum bend radii of 12 inches.
- i. Ground rods not described elsewhere shall be a minimum of 3/4 inch in diameter by 10 feet long, with a copper jacket bonded to a steel core.
- j. Test wells and covers for non-traffic areas shall be molded high density polyethylene. Test wells for traffic areas shall be precast concrete construction rated for traffic duty with concrete or cast iron covers.

B. Grounding System Resistance

- 1. The ground system resistance shall comply with National Electrical Code.
- 2. The grounding system design depicted on the Contract Drawings is the minimum design required for each building or structure. Each system shall comply with the maximum resistance of 5 ohms to ground. Contractor shall confirm the system grounding resistance with the results of the testing specified herein. Systems exceeding the maximum resistance specified shall be supplemented with additional grounding provisions and retested until the maximum specified resistance is achieved.

C. Grounding System Testing

- 1. The grounding system of each new building or structure and each existing building or structure indicated below, shall be tested to determine the resistance to earth. Testing shall be performed by an independent electrical or grounding system testing organization. Testing shall be completed after not less than three full days without precipitation and without any other moistening or chemical treatment of the soil.
- 2. New Grounding Systems
 - a. Grounding systems of each new building or structure shall be tested for resistance to earth utilizing the three-point fall of potential test as defined by IEEE 81. Testing shall be completed prior to installation of the electrical distribution equipment to ensure the grounding system is isolated from the utility grounding

system and the systems of other structures. The current source probe for the test shall be placed in soil at a distance of 5 to 10 times the distance of the widest measurement across the grounding system ring or grid to ensure adequate measurements outside of the grounding system's sphere of influence. Test probe measurements shall be taken at a distance of one foot from the grounding system reference connection and at each 10 percent increment from the grounding system reference connection to the current source probe location. Test results shall be documented on a graphical plot with resistance in ohms on the vertical axis and distance in feet on the horizontal axis. The results shall clearly indicate a system resistance plateau which confirms a valid test procedure.

3. Existing Grounding Systems

- a. Grounding systems of each existing building or structure indicated shall be tested for resistance to earth.

Existing building(s) or
structure(s) to be tested

*Power Center P4, P5, and P4
MCC-P4A, MCC-P5A, MCC-P6A*

- b. Where existing grounding systems can be isolated from the building power service or utility power service a three-point fall of potential test shall be completed as indicated above. Where isolation of the building grounding system is not practical, a clamp-on resistance test will be an acceptable alternative. Clamp-on resistance testing shall be completed utilizing a ground resistance tester specifically designed for clamp on resistance testing, such as the AEMC "Model 3711". Clamp-on resistance measurements shall be taken at the service side of the service entrance neutral, upstream of the neutral to ground bonding connection to ensure a single path between the grounding system and the utility reference.

4. Grounding System Test Report

- a. A report certified by the testing organization shall be prepared and submitted in accordance with the Submittal Procedures section. The final report shall include complete testing results for each building or structure, graphical representation of the test point results for the three-point fall of potential method, and complete observations of all site weather conditions and other environmental conditions that may affect the test results. Final acceptance of the results reported shall be subject to the review and approval of Engineer.

3.11 LIGHTING FIXTURE INSTALLATION

- A. The Drawings indicate the general locations and arrangements of the lighting fixtures. Fixtures in rows shall be aligned both vertically and horizontally unless otherwise specified. Fixtures shall be clear of pipes, mechanical equipment, structural openings, indicated future equipment and structural openings, and other obstructions.
- B. Conduit and wire for lighting fixture installation is not shown on the Drawings and shall be sized, furnished and installed by Contractor. Circuits to emergency lighting units, exit signs, and fixtures indicated to be night lights shall not be switched. Circuits to lighting fixtures indicated to have emergency battery packs shall include an additional un-switched hot

Electrical

conductor. Conductors shall be minimum 12 AWG and conduit shall be minimum 3/4 inch for lighting fixture installation.

3.12 POWER FACTOR CORRECTION CAPACITOR INSTALLATION

- A. Not used.

3.13 HEAT-TRACED PIPING INSTALLATION

- A. Not used.
- B. Modifications to existing equipment shall be completed as specified herein and indicated on the Drawings. All existing facilities shall be kept in service during construction. Temporary power or relocation of existing power and control wiring, equipment, and devices shall be provided as required during construction. Coordination and timing of outages shall be as specified in other sections of these Specifications. Electrical power interruptions will only be allowed where agreed upon in advance with Owner, and scheduling at times of low demand may be required.
- C. Demolition
 - 1. Unless otherwise specified or indicated on the Drawings, all cable and all exposed conduit for power and control signals of equipment indicated to be removed shall be demolished. Conduit supports and electrical equipment mounting hardware shall be removed, and holes or damage remaining shall be grouted or sealed flush. Conduit partially concealed shall be removed where exposed, and plugged with expanding grout flush with the floor or wall. Repairs shall be refinished to match the existing surrounding surfaces. Demolished equipment shall be discarded or salvaged as indicated on the Drawings and as specified in other sections of these Specifications.

End of Section

STANDARD SPECIFICATIONS

REFERENCE: UL 83, ICEA S-95-658 (NEMA WC70).

CONDUCTOR: Solid, uncoated copper. Wet/dry maximum operating temperature 90°C.

INSULATION: Polyvinyl chloride, UL 83, Type THHN and THWN-2, ICEA S-95-658.

SHIELD: None.

JACKET: Conductor: Nylon, 4 mils (100 µm) minimum thickness, UL 83.

FACTORY TESTS: Cable shall meet the requirements of UL 83 for Type THHN and THWN-2.

Cable Details

Size		Number of Strands	Conductor Insulation Thickness*		Maximum Outside Diameter	
AWG or kcmil	mm ²		in.	µm	in.	mm
12	4.0	1	0.015	380	0.14	3.56
10	6.0	1	0.020	510	0.17	4.32

*The average thickness shall be not less than that indicated above. The minimum thickness shall not be less than 90 percent of the values indicated above.

A durable marking shall be provided on the surface of the cable at intervals not exceeding 24 inches (600 mm). Marking shall include manufacturer's name, THWN-2 or THHN, conductor size, and 600 volt.

600 Volt, Single Conductor Lighting Cable (600-1-PVC-THHN-THWN-2)**BLACK & VEATCH****Cable Data****Figure 1-26 0511**

Electrical

STANDARD SPECIFICATIONS

REFERENCE: ICEA S-95-658 (NEMA WC 70).

CONDUCTOR: Concentric-lay, uncoated copper; strand Class B. Wet/dry maximum operating temperature 90°C.

INSULATION: Cross-linked thermosetting polyethylene, ICEA S-95-658, Paragraph 3.6.

SHIELD: None.

JACKET: None.

FACTORY TESTS: Cable shall meet the requirements of ICEA S-95-658.

Cable Details

Size		Number of Strands	Conductor Insulation Thickness*		Maximum Outside Diameter	
AWG or kcmil	mm ²		in.	μm	in.	mm
14	2.5	7	0.030	760	0.15	3.81
12	4.0	7	0.030	760	0.17	4.32
10	6.0	7	0.030	760	0.19	4.83
8	10.0	7	0.045	1140	0.25	6.35
6	16.0	7	0.045	1140	0.28	7.11
4	25.0	7	0.045	1140	0.34	8.64
2	35.0	7	0.045	1140	0.40	10.16
1	40.0	19	0.055	1400	0.46	11.68
1/0	50.0	19	0.055	1400	0.50	12.70
2/0	70.0	19	0.055	1400	0.55	13.97
4/0	95.0	19	0.055	1400	0.66	16.76
250	120.0	37	0.065	1650	0.73	18.54
350	185.0	37	0.065	1650	0.83	21.08
500	300.0	37	0.065	1650	0.96	24.38
750	400.0	61	0.080	2030	1.20	30.48
1,000	500.0	61	0.080	2030	1.32	33.53

*The average thickness shall be not less than that indicated above. The minimum thickness shall be not less than 90 percent of the values indicated above.

A durable marking shall be provided on the surface of the cable at intervals not exceeding 24 inches (600 mm). Marking shall include manufacturer's name, XLP, XHHW-2, conductor size, and voltage class.

600 Volt, Single Conductor Lighting/Power Cable (600-1-XLP-XHHW-2)

BLACK & VEATCH

Cable Data

Figure 2-26 0511

STANDARD SPECIFICATIONS				
REFERENCE:	UL 66, UL 1277.			
CONDUCTOR:	16 AWG (1.5 mm ²), 7-strand, concentric-lay, uncoated copper. Maximum operating temperature 90°C dry, 75°C wet.			
INSULATION:	Polyvinyl chloride, not less than 15 mils (380 μm) average thickness; 13 mils (330 μm) minimum thickness, UL 66, Type TFN.			
LAY:	Twisted pair with 1-1/2 inch to 3 inch (38.10 mm - 63.5 mm) lay.			
SHIELD:	Cable assembly, combination aluminum-polyester tape and 7-strand, 20 AWG (0.5 mm ²) minimum size, tinned copper drain wire, shield applied to achieve 100 percent cover over insulated conductors.			
JACKET:	Conductor: Nylon, 4 mils (100 μm) minimum thickness, UL 66. Cable assembly: Black, flame-retardant polyvinyl chloride, UL 1277, applied over tape-wrapped cable core.			
CONDUCTOR IDENTIFICATION:	One conductor black, one conductor white.			
FACTORY TESTS:	Insulated conductors shall meet the requirements of UL 66 for Type TFN. Assembly jacket shall meet the requirements of UL 1277. Cable shall meet the vertical-tray flame test requirements of UL 1277.			
Cable Details				
	Assembly Jacket Thickness*		Maximum Outside Diameter	
	in.	μm	in.	mm
Single Pair	0.045	1140	0.34	8.64
*The average thickness shall be not less than that indicated above. The minimum thickness shall be not less than 80 percent of the value indicated above. A durable marking shall be provided on the surface of the cable at intervals not exceeding 24 inches (600 mm). Marking shall include manufacturer's name, Type TC, Type TFN, conductor size, single pair, and voltage class.				
600 Volt, Single Pair, Shielded Instrument Cable (600-SINGLE-PAIR-SH-INSTR)				
BLACK & VEATCH	Cable Data		Figure 4-26 0511	

STANDARD SPECIFICATIONS

REFERENCE:	UL 83, UL 1277, ICEA S-73-532, ICEA S-58-679.
CONDUCTOR:	14 AWG (2.5 mm ²), 7 or 19 strands, concentric-lay, uncoated copper. Maximum operating temperature 90°C dry, 75°C wet.
INSULATION:	Polyvinyl chloride, not less than 15 mils (380 μ m) average thickness; 13 mils (330 μ m) minimum thickness, UL 83, Type THHN and THWN.
SHIELD:	None.
JACKET:	Conductor: Nylon, 4 mils (100 μ m) minimum thickness, UL 83. Cable assembly: Black, flame-retardant polyvinyl chloride, UL 1277, applied over tape-wrapped cable core.
CONDUCTOR IDENTIFICATION:	ICEA S-58-679, Method 1, Table 2 or ICEA S-58-679, Method 3, Table 2. White or green conductors shall not be provided.
FACTORY TESTS:	Insulated conductors shall meet the requirements of UL 83 for Type THHN-THWN. Assembly jacket shall meet the requirements of UL 1277. Cable shall meet the flame test requirements of UL 1277 for Type TC-ER power and control tray cable.

Cable Details

Number of Conductors	Assembly Jacket Thickness*		Maximum Outside Diameter	
	in.	μ m	in.	mm
2	0.045	1140	0.38	9.65
3	0.045	1140	0.39	9.91
4	0.045	1140	0.41	10.41
5	0.045	1140	0.46	11.68
7	0.045	1140	0.49	12.45
9	0.045	1140	0.59	14.99
12	0.045	1140	0.66	16.76
19	0.060	1520	0.77	19.56
25	0.060	1520	0.88	22.35
30	0.060	1520	0.98	24.89
37	0.080	2030	1.05	26.67

*The average thickness shall be not less than that indicated above. The minimum thickness shall be not less than 80 percent of the values indicated above.

A durable marking shall be provided on the surface of the cable at intervals not exceeding 24 inches (600 mm). Marking shall include manufacturer's name, Type TC-ER, Type THWN or THHN, conductor size, number of conductors, and voltage class.

600 Volt, Multiconductor 14 AWG (2.5 mm²) Control Cable (600-MULTI-THHN-THWN)**BLACK & VEATCH****Cable Data****Figure 7-26 0511**

STANDARD SPECIFICATIONS

REFERENCE:	UL 83, UL 1277, ICEA S-73-532, ICEA S-58-679.
CONDUCTOR:	12 AWG (4 mm ²), 7 or 19 strands, concentric-lay, uncoated copper. Maximum operating temperature 90°C dry, 75°C wet.
INSULATION:	Polyvinyl chloride, not less than 15 mils (380 μm) average thickness; 13 mils (330 μm) minimum thickness, UL 83, Type THHN and THWN.
SHIELD:	None.
JACKET:	Conductor: Nylon, 4 mils (100 μm) minimum thickness, UL 83. Cable assembly: Black, flame-retardant polyvinyl chloride, UL 1277, applied over tape-wrapped cable core.
CONDUCTOR IDENTIFICATION:	ICEA S-58-679, Method 1, Table 2 or ICEA S-58-679, Method 3, Table 2. White or green conductors shall not be provided.
FACTORY TESTS:	Insulated conductors shall meet the requirements of UL 83 for Type THHN-THWN. Assembly jacket shall meet the requirements of UL 1277. Cable shall meet the flame test requirements of UL 1277 for Type TC-ER power and control tray cable.

Cable Details

Number of Conductors	Assembly Jacket Thickness*		Maximum Outside Diameter	
	in.	μm	in.	mm
2	0.045	1140	0.41	10.41
3	0.045	1140	0.45	11.43
4	0.045	1140	0.48	12.19
5	0.045	1140	0.51	12.95
7	0.045	1140	0.58	14.73
9	0.060	1520	0.69	17.53
12	0.060	1520	0.77	19.56
19	0.060	1520	0.89	22.61
25	0.060	1520	1.05	26.67
30	0.080	2030	1.15	29.21
37	0.080	2030	1.25	31.75

*The average thickness shall be not less than that indicated above. The minimum thickness shall be not less than 80 percent of the values indicated above.

A durable marking shall be provided on the surface of the cable at intervals not exceeding 24 inches (600 mm). Marking shall include manufacturer's name, Type TC-ER, Type THWN or THHN, conductor size, number of conductors, and voltage class.

600 Volt, Multiconductor 12 AWG (4 mm²) Control Cable (600-MULTI-THHN-THWN)**BLACK & VEATCH****Cable Data****Figure 8-26 0511**

Electrical

SECTION 26 05 83 - ELECTRICAL EQUIPMENT INSTALLATION

PART 1 - GENERAL

1.1 SCOPE

- A. This section covers the installation of electrical equipment.

1.2 GENERAL

- A. Equipment specified to be installed under this section shall be erected, and placed in proper operating condition in full conformity with Drawings, Specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by Engineer.
- B. The electrical equipment identified as being provided by others will be furnished complete for installation by Contractor. Technical specifications under which the equipment will be purchased are available.
- C. Coordination
 - 1. When manufacturer's field services are provided by the equipment manufacturer, Contractor shall coordinate the services with the equipment manufacturer. Contractor shall give Engineer written notice at least 14 days prior to the need for manufacturer's field services furnished by others.
 - 2. Submittals for equipment furnished under the original procurement contract will be furnished to Contractor upon completion of review by Engineer. Contractor shall review equipment submittals and coordinate with the requirements of the Work and the Contract Documents. Contractor accepts sole responsibility for determining and verifying all quantities, dimensions, and field construction criteria.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Delivery

- 1. When sills are required for electrical equipment, they shall be shipped ahead of the scheduled equipment delivery to permit installation before concrete is placed.

B. Storage

- 1. Upon delivery, all equipment and materials shall immediately be stored and protected by Contractor in accordance with Product Storage and Handling Requirements section, and in accordance with manufacturer's written instructions, until installed in the Work. Equipment shall be protected by Contractor against damage and exposure from the elements. At no time shall the equipment be stored on earth or grass surfaces or come

Electrical Equipment Installation

into contact with earth or grass. Contractor shall keep the equipment clean and dry at all times. Openings shall be plugged or capped (or otherwise sealed by packaging) during temporary storage.

C. Handling

1. Electrical equipment shall be moved by lifting, jacking, or skidding on rollers as described in the manufacturer's instructions. Special lifting harness or apparatus shall be used when required. Lifting and jacking points shall be used when identified on the equipment. Contractor shall have required unloading equipment on site to perform unloading work on the date of equipment delivery.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 INSTALLATION, TESTING, AND COMMISSIONING

- A. All installation work shall be in accordance with manufacturer's written instructions.
- B. All material, equipment, and components specified to be installed according to this section shall be installed, tested, and commissioned for operation in compliance with NECA 1000 – NEIS Specification System. Where required in NECA 1000, testing and commissioning procedures shall be followed prior to energizing equipment.
- C. Electrical equipment cubicles and vertical sections shall be installed plumb and level. Drawout equipment carriages, circuit breakers, and other removable components shall operate free and easy without binding or distortion.
- D. Unless otherwise indicated or specified, all indoor floor-mounted electrical equipment and control cabinets shall be installed on concrete equipment pads four inches [102 mm] in height.
- E. Indoor metalclad switchgear shall be bolted to steel floor channels which are installed level and flush with the top of the concrete floor or equipment pad.
- F. Outdoor metalclad switchgear and interrupter gear with integral floor channels or beams shall be secured to concrete pads with anchor bolts and clips.
- G. Motor control centers with integral floor sills shall be secured to concrete floors or equipment pads with anchor bolts.
- H. Adequate bracing shall be provided for seismic forces. The bracing shall be designed to meet the requirements of the Meteorological and Seismic Design Criteria section.
- I. Cleaning

Electrical Equipment Installation

1. All deposits of oil, grease, mud, dirt or debris shall be cleaned from the electrical equipment following installation and field wiring. A detergent water based solution, or other liquid cleaners not harmful to material or equipment finishes, shall be used as recommended by the manufacturer.

End of Section

This page intentionally left blank.

SECTION 26 24 23 - 600 VOLT CLASS MOTOR CONTROL CENTERS

PART 1 - GENERAL

1.1 SCOPE

- A. This section covers motor control center (MCC) equipment which shall be furnished and installed as specified herein and as indicated on the Drawings. Motor control centers shall meet the following requirements, and the design conditions and features specified herein.
- B. Motor control centers shall be designated and shall be located as follows:

Tag number(s)	<i>MCC-P4B, MCC-P5B, MCC-P6B</i>
Location of motor control center(s)	<i>New Pre-fabricated Metal Building</i>

1.2 GENERAL

- A. Equipment furnished and installed under this section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with the Drawings, Specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless Engineer notes exceptions.
- B. General Equipment Stipulations
 - 1. The General Equipment Stipulations section shall apply to all equipment furnished under this section. If requirements in this section differ from those in the General Equipment Stipulations section, the requirements specified herein shall take precedence.
- C. Seismic Design Requirements
 - 1. Seismic design requirements for products specified herein shall be as indicated in the Meteorological and Seismic Design Criteria section.
- D. Dimensional Restrictions
 - 1. Layout dimensions will vary between manufacturers and the layout area indicated on the Drawings is based on typical values. The supplier shall review the Contract Drawings, the manufacturer's layout drawings and installation requirements, and make any modifications required for proper installation subject to acceptance by Engineer.
- E. Workmanship and Materials
 - 1. Equipment supplier shall guarantee all equipment against faulty or inadequate design, improper assembly or erection, defective workmanship or materials, and leakage, breakage, or other failure. Materials shall be suitable for service conditions.

2. All equipment shall be designed, fabricated, and assembled in accordance with applicable governing standards. Individual parts shall be manufactured to standard sizes and thicknesses so that repair parts, furnished at any time, can be installed in the field. Like parts of duplicate units shall be interchangeable. Equipment shall not have been in service at any time prior to delivery, except when required by tests.

F. Governing Standards

1. All equipment furnished under this section shall be designed, constructed, and tested in accordance with the following standards:
 - a. NEMA ICS 18
 - b. UL 845.
2. The equipment shall also conform to all the applicable standards of ANSI, IEEE, NEMA, UL, and NFPA 70.
3. Equipment covered by this section shall be listed by UL or a nationally recognized third-party testing laboratory. All costs associated with obtaining the listing shall be the responsibility of the Contractor. In the event, no third-party testing laboratory provides the required listing; an independent test shall be performed at the Contractor's expense. Before testing, the Contractor shall submit a copy of the testing procedure that will be used in evaluating the equipment.

G. Nameplates

1. Nameplates with unit description and designation of each control or indicating device shall be provided on all hinged doors. Nameplates shall be black and white laminated phenolic material of suitable size, and shall be engraved with 3/8 inch high letters for compartment identity and 3/16 inch letters for other information. The engraving shall extend through the black exterior lamination to the white center.
2. Each control device and each control wire terminal block connection inside the units shall be identified with permanent nameplates or painted legends to match the identification on the manufacturer's wiring diagram.

H. System Characteristics

1. This equipment will be connected to a power system with characteristics as specified below.

Voltage	480 V
Frequency	60 Hz
Type	Three phase

1.3 SUBMITTALS

A. Drawings and Data

1. Complete assembly, foundation, and installation drawings, together with complete engineering data covering the materials used, parts, devices, and accessories forming a part of the motor control center shall be submitted in accordance with the Submittal Procedures section. The drawings and data shall include, but shall not be limited to, the following:

- a. Motor Control Center

- 1) Elevation, plans, and weight.
- 2) Unit wiring diagrams showing devices, connections, and terminal designations.
- 3) Interconnection diagrams.
- 4) Control schematic diagrams.
- 5) Circuit breaker time-current characteristic curves.
- 6) Surge protective device submittals shall include drawings (including unit dimensions, weights, component and connection locations, mounting provisions, and wiring diagrams), equipment manuals that detail the installation, operation and maintenance instructions for the specified unit(s), and manufacturer's descriptive bulletins and product sheets.

- b. Seismic Design Requirements

- 1) Confirmation of compliance with the requirements of the Meteorological and Seismic Design Criteria section.

B. Operation and Maintenance Data and Manuals

1. Operation and maintenance manuals shall be submitted in accordance with the Submittal Procedures section. The operation and maintenance manuals shall be in addition to any instructions or parts lists packed with or attached to the equipment when delivered.

1.4 SPARE PARTS

- A. Spare parts shall be suitably packaged, as specified herein, with labels indicating the contents of each package. Spare parts shall be delivered to Owner as directed. Spare parts shall be provided as follows:

Spare Parts	Quantity
Fuses	100% replacement set
Indicating lamps	100% replacement set

1.5 PROTECTIVE DEVICE STUDY

- A. Not used.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Shipping shall be in accordance with the Product Delivery Requirements section. Handling and Storage shall be in accordance with the Product Storage and Handling Requirements section.

- B. Motor control centers shall be equipped to be handled by a crane. Where cranes are not available, control centers shall be suitable for skidding in place on rollers using jacks to raise and lower the groups.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. The equipment shall be manufactured by ABB, Allen-Bradley, Eaton, Schneider-Electric, or Siemens without exception.

2.2 CONSTRUCTION

- A. Each control center shall conform to the arrangement, one-line diagram, schematics, and requirements indicated on the Drawings or specified herein. End sections shall include provisions for main, ground and neutral bus extensions and installation of future vertical sections.
- B. Adequate bracing shall be provided for seismic forces. The bracing shall be designed to meet the requirements of the Meteorological and Seismic Design Criteria section.
- C. Vertical Sections
 - 1. The control center shall consist of standardized, freestanding structures bolted together to form a single dead-front panel assembly containing combination motor control units; feeder units; transformers; lighting panels; and metering, relaying, and interlocking, and miscellaneous control devices, as indicated on the Drawings. A removable lifting angle shall be mounted on the top of each shipping group. Removable front and rear bottom channel sills shall extend the full width of the motor control center.
 - 2. Each vertical section shall be 90 inches high and not less than 20 inches wide. Sections shall be 20 inches deep. Each 20 inch wide standard section shall have all necessary hardware and busing for modular plug-in units to be added and moved around. All unused space shall be covered by hinged blank doors and equipped to accept future units. Removable rear plates shall be sectionalized so that it is unnecessary to handle any plate larger than the section width or one-half the section height.
 - 3. A metal barrier extending the full height and depth of the section shall be provided to isolate each section from the next section.
- D. Compartmented Units
 - 1. Each vertical section shall be constructed of modular components of various sizes. The modular components shall be designed to accommodate not more than six Size 1 or Size 2 full voltage combination motor starters per vertical section.
 - 2. Removable circuit breaker and motor starter units shall be provided with a mechanical interlock to prevent insertion or withdrawal when in the "on" position.

3. Individual motor starter units, feeder breaker units, transformers, lighting panels, and control device compartments shall be isolated from each other by barriers of metal or a suitable insulating material.
4. Each vertical section shall have a vertical-wiring trough for power and control wiring, and wiring troughs on top and bottom, which are continuous through the entire control center. Wire ties shall be provided in the vertical wireways unless the wireways are separated from the plug-in units by a permanent wall.

E. Wiring Labels and Terminal Blocks

1. All internal wires shall be labeled at each termination. Terminals shall also be identified with labels showing the terminal block and terminal number.
2. All starter units shall be provided with unit control terminal blocks. Terminal blocks shall be pull-apart type rated 20 amperes. All current carrying parts shall be tin-plated. The removable portion of the terminal blocks shall be used for factory installed wiring.

F. Busing

1. The horizontal main bus and the vertical bus extensions shall be tin-plated copper mounted on supports formed of materials having high dielectric strength, low moisture absorbency, and high impact strength. The main bus shall extend the full length of the motor control center and shall have provisions for splicing additional sections onto either end. Both horizontal and vertical busing shall be braced against forces resulting from fault current.
2. The vertical bus connecting an incoming power feeder cable shall have the same ampere rating as the main horizontal bus. Each vertical bus extension shall be rated for the total connected load of the vertical section.
3. A tin-plated copper ground bus rated 300 amperes shall extend through the entire control center and shall be located where it will not interfere with pulling of external cable. Grounding connections shall be accessible from the front. The ground bus shall be provided with six 0.38 inch holes for each vertical section to accept ground lugs for any loads requiring a ground conductor. A solderless connector shall be provided on the ground bus in each end section for an external ground cable, sized from 1/0 AWG to 250 kcmil.
4. Each vertical section shall have a vertical ground bus. The plug-in units shall engage the ground bus prior to engagement of the power stabs and shall disengage only after the power stabs are disconnected.
5. Neutral Bus
 - a. A tin-plated copper neutral bus shall be provided through all vertical sections and shall be rated full capacity.
6. Neutral Pad

- a. The incoming line section shall be equipped with a neutral bond lug suitable to bond the service entrance neutral conductors. The service entrance neutral pad shall be equipped with a main bonding jumper to the control center ground bus in accordance with the National Electrical Code.

G. Isolation of Buses

1. The main bus shall be isolated from the horizontal wiring trough. The entire vertical bus assembly shall be enclosed within grounded steel or glass filled polyester barriers. The barriers shall have openings for power stabs of plug-in units. Shutters shall be provided to close the openings when units are removed.

H. Combination Magnetic Starters

1. As indicated on the Drawings, control center starters shall be breaker combination, magnetic, reduced voltage, or across-the-line type as follows:
 - a. Starters shall be 3 phase, 60 Hz contactors with overloads, a 120 volts ac coil, a dry type control transformer, and a molded-case circuit breaker. Control transformers shall be mounted with the removable starters and shall have capacity for all simultaneous loads. Control transformers shall have both primary leads fused, one secondary lead fused, and one secondary lead grounded.
 - b. Contactors shall be NEMA rated and have an 8 hour current rating in accordance with the latest NEMA standards. Contactors of reversing or multispeed starters shall be mechanically and electrically interlocked.
 - c. One NO and one NC spare interlock contacts, whether on the starter or a relay, shall be wired separately to the unit terminal board.
 - d. Motor starters shall be provided with a green indicating light for OFF, red indicating light for ON, and amber indicating light for FAILURE/ALARM.
 - e. Elapsed time meters shall be provided on all new combination starters for motors above one horsepower. Elapsed time meters will not be provided for HVAC motor starters.
 - f. Motor starters NEMA size 4 and smaller shall be draw-out type with automatic disconnect of control and motor power conductors, and automatic shutters shall be provided.
 - g. Heaterless overload protection shall be provided by three current sensors monitored by a microprocessor. The overload device shall also include phase loss and unbalance protection, trip class selection, Class II ground fault protection.. The overload shall have the option for auto or manual reset. When auto is selected the overload shall reactivate after power line conditions return to an acceptable level. Trip and reset delays shall prevent nuisance tripping due to rapidly fluctuating power line conditions.
 - h. An external manual breaker operating handle with provisions for up to three padlocks shall be provided on each starter. The access door shall be interlocked with the circuit breaker so that the door cannot be opened, except by an interlock override, while the breaker is closed.
 - i. Contractor shall match control transformers, overloads, and minimum sizes of starters to equipment furnished, which may differ from the estimated values indicated on the Drawings. Overload relay elements shall be sized to reflect reduced motor current caused by load-side power factor correction capacitors.

600 Volt Class Motor Control Centers

- j. Unless otherwise specified, spare starters shall have breakers and overloads sized for the largest rated motor and 100 watts extra transformer capacity.
- I. Combination Solid-State Starters
- J. Not used.
- K. Adjustable Frequency Drives
 - Not used.
- L. Contactors
 - 1. Contactors for control of bus voltage loads other than motors shall be the same as contactors for combination magnetic starters, except overloads will not be required. Mechanically held contactors shall have 120 volts ac coils with disconnecting contacts. Other contactors shall have 120 volt, continuous duty coils and contacts where indicated on the Drawings.
- M. Relays and Timers
 - 1. Auxiliary relays and timers shall have 120 volt, 60 Hz coils for continuous duty in 40°C ambient, and 10 ampere, 120 volts ac contacts. Auxiliary relays shall be NEMA rated.
- N. Control Switches and Pilot Lights
 - 1. Control switches and pilot lights shall be 30.5 mm heavy-duty, oiltight construction. Pilot lights shall be full voltage type with LED lamps.
- O. Circuit Breakers
 - 1. Control center disconnects shall be three pole, single-throw, 600 volt, molded-case air circuit breakers. Circuit breakers of combination starters shall be magnetic motor circuit protector type. Feeder circuit breakers shall be thermal-magnetic type and shall be manually operated, with quick-make, quick-break, trip-free toggle mechanism. Bimetallic thermal elements shall withstand sustained overloads and short-circuit currents without injury and without affecting calibration. Thermal elements shall trip the breaker at 125 percent of trip rating. The instantaneous elements of 225 ampere frame and larger breakers shall be adjustable and shall be set at 800 percent of trip rating.
 - 2. Main circuit breakers and feeder circuit breakers 225 amperes and larger shall be furnished with a solid-state trip unit complete with built-in current transformers. The ampere rating of the trip unit shall be as indicated on the Drawings. The trip unit shall have adjustable settings for continuous amperes, and short-time pickup. The trip unit shall be provided with additional short delay trip time adjustment for better system coordination. Where indicated on the Drawings, main circuit breakers shall be provided with instantaneous pickup and integral ground fault protection with shunt trip devices.
- P. Surge Protective Devices
 - 1. Scope

- a. Surge Protective Devices (SPD) shall be provided as specified herein and as indicated on the Drawings. Each unit shall be designed for parallel connection to the facility's wiring system and shall utilize non-linear voltage-dependent metal oxide varistors (MOV) in parallel.
- b. SPD's shall be furnished and installed for the electrical equipment indicated on the Drawings and designated in this section and as specified herein. SPD's shall be installed integral to each MCC and MCC panelboard.

2. Standards

- a. The specified unit shall be designed, manufactured, tested and installed in compliance with the following standards:
 - 1) ANSI/IEEE C62.41 and C62.45;
 - 2) ANSI/IEEE C62.1 and C62.11;
 - 3) NEMA LS1;
 - 4) NFPA 20, 70, 75, and 78;
 - 5) UL 1449 and 1283
- b. The unit shall be UL 1449 Listed as a Type 2 Surge Protective Device and UL 1283 Listed as an Electromagnetic Interference (EMI) Filter.

3. Environmental Requirements.

- a. Operating Temperature: 0°F to +140°F.
- b. Relative Humidity: Reliable operation with 5 percent to 95 percent non-condensing.

4. Electrical Requirements

- a. Unit Operating Voltage. The nominal unit operating voltage and configuration shall be as indicated on the Drawings.
- b. Maximum Continuous Operating Voltage (MCOV). The SPD shall be designed to withstand a MCOV of not less than 115 percent of nominal RMS voltage.
- c. Operating Frequency. Operating frequency range shall be 47 to 63 Hertz.
- d. Protection Modes. Four-wire configured systems shall provide Line-to-Neutral (L-N), Line-to-Ground (L-G), Line-to-Line (L-L), and Neutral-to-Ground (N-G) protection. Three-wire configured systems shall provide Line-to-Line (L-L) protection and Line-to-Ground (L-G) protection.
- e. Rated Single Pulse Surge Current Capacity. The rated single pulse surge current capacity, in amps, for each mode of protection of the unit shall be as required and shall be no less than listed in the following table. Lighting panels shall be rated for the low exposure level capacity unless otherwise noted.

	L-N	L-G	N-G	L-L
High Exposure Level	120 kA	120 kA	120 kA	120 kA
Medium-High Exposure Level	100 kA	100 kA	100 kA	100 kA
Medium Exposure Level	80 kA	80 kA	80 kA	80 kA
Low Exposure Level	60 kA	60 kA	40 kA	60 kA

- f. UL 1449 Voltage Protection Rating (VPR). The maximum VPR for the device (inclusive of disconnect) shall be as required and shall not exceed the following:

Voltage	L-N	L-G	N-G	L-L
120/208 3-phase	800 V	800 V	800 V	1200 V]
480 V 3W		1200 V		2000 V

- g. Noise Attenuation. The unit shall be capable of a minimum -30 dB attenuation at 100kHz when tested per the 50 ohm insertion loss method as defined by MIL-STD-220C.
- h. Nominal Discharge Current. Each SPD shall have a nominal discharge current rating of 20 kA.
- i. Overcurrent Protection. At high and medium-high exposure levels, the SPD shall incorporate internal fusing capable of interrupting, at minimum, up to 200kA symmetrical fault current with 600 volts ac applied.
At medium and low exposure levels, the SPD shall incorporate internal fusing capable of interrupting, at minimum, up to 65kA symmetrical fault current with 600 volts ac applied.
The device shall be capable of allowing passage of the rated maximum surge current for every mode without fuse operation.
- j. Unit Status Indicators. The unit shall include long-life, externally visible phase indicators that monitor the on-line status of the unit.

5. Warranty

- a. The manufacturer shall provide a minimum Five Year Limited Warranty from date of shipment against failure when installed in compliance with applicable national/local electrical codes and the manufacturer's installation, operation and maintenance instructions.

6. Installation

- a. Each SPD shall be installed according to the manufacturer's recommendations. If possible for the integral units, provide direct bus connections.

7. Accessories

- a. Disconnect Switch. Each SPD shall be furnished with an integral disconnect switch. The unit shall be UL1449 listed as such, and the UL1449 Voltage Protection Ratings shall be provided. The disconnect switch shall be fused and capable of withstanding the published maximum surge current magnitude without failure or damage to the switch.
- b. Dual Form "C" Dry Contacts. The SPD shall be provided with a set of form "C" dry contacts (normally open and normally closed) to facilitate connection to a plant control system or other remote monitoring system. The contacts shall be normally open or normally closed and shall change state upon any alarm condition.

Q. Incoming Line Metering Compartment

1. The incoming line section(s) shall be provided with a microprocessor-based, digital power meter. Current transformers and potential transformers shall be provided for input of current and voltage signals to the metering package. Phase currents, phase voltages, watts, vars, power factor, frequency, watt-hours, watt demand, and total harmonic distortion waveforms shall be available for display. Metering units shall also include a display with touch screen monitor on the front of the equipment. The following alarm features shall be provided: undervoltage, power factor leading or lagging, kVAR limit, voltage sequence reversal, under frequency, and overcurrent. The metering package shall be capable of at least one Ethernet 10/100 Base-T communication port (Ethernet/IP) for remote monitoring. Signals to be monitored on SCADA shall be per Owner discretion, as programmed by the I&C System Supplier. The digital power meters shall be Allen-Bradley "Power Monitor 5000", Eaton "Power Xpert Meter 4000", Multilin "EPM9700", Schneider-Electric "PowerLogic Model ION9000", or Siemens "9410 Series".
2. Sufficient lengths of communication cable shall be provided for connection of metering units within the motor control center and as indicated on the Drawings.
3. The metering package shall be compatible with the metering system software and metering system network as specified in the Electrical section. Contractor shall furnish and install applications software for origination and display of all metering unit data and microprocessor-based trip-unit data in accordance with the Electrical section.

R. Miscellaneous

1. Other items indicated on the Drawings shall conform to the applicable provisions of NEMA ICS 2 and UL 845.

S. Lighting Transformers

1. Lighting and auxiliary power transformers shall be dry type, with at least two full capacity taps.

T. Panelboards

1. Panelboards shall have a main circuit breaker, buses, bolted thermal-magnetic breakers, and provisions for breakers in the sizes, quantities, and poles indicated on the Drawings. Breakers shall indicate "On", "Off", and "Tripped". Breakers indicated to be multiple pole shall be common trip. Circuit breakers shall be fully rated, with an interrupting rating of at least 10,000 amperes, and shall be coordinated with the control center short-circuit rating. The panel shall have main and neutral buses insulated from the enclosure, and a ground bus. Buses shall be copper, with ampere ratings and main lugs or breaker as indicated. The ground bus shall be similar to a neutral bus and shall have a good ground connection to the enclosure, and a removable bond to the neutral bus. Each panel shall be provided with a typewritten directory listing the load identities of all circuits. Six breaker handle clips shall be provided to prevent casual tripping. Panelboards shall be 120/208 V, 3-phase.

U. Special Panels

600 Volt Class Motor Control Centers

1. Instruments, controls, and accessories shall be mounted either on special doors or on sheet steel panels mounted behind hinged doors, as indicated on the Drawings. All panels and hinges shall be sufficiently strong to support the mounted items.

V. Shop Painting

1. All iron and steel surfaces, except stainless steel and machined surfaces, shall be plated or shop painted with the manufacturer's standard coating. Finish color for both indoor and outdoor equipment shall be ANSI 61. Field painting, other than touchup painting, will not be required. A sufficient quantity of additional coating material and thinner shall be furnished to permit field touchup of damaged coatings.
2. The underside of equipment to be installed in exposed outdoor locations shall be thoroughly cleaned and coated with an automotive type undercoating material. The coating shall be thick enough to withstand normal handling during shipping and installation. The underside is defined as the surfaces in contact with the floor or pad and other surfaces not readily accessible for field painting. The coating may be factory or field applied.

W. Space Heaters

X. Not used.

2.3 SHOP TESTS

- A. The complete control center shall be tested at the factory. All circuits, including power and control, shall be given dielectric tests in accordance with NEMA ICS 2-322.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation shall be in accordance with the Electrical Equipment Installation section.

3.2 FIELD QUALITY CONTROL

Not used.

3.3 TRAINING

- A. Not used.

End of Section

This page intentionally left blank.

SECTION 31 23 11 - EXCAVATION AND FILL FOR STRUCTURES

PART 1 - GENERAL

1.1 SCOPE

- A. This section covers earthwork and shall include the necessary clearing, grubbing, and preparation of the site; removal and disposal of all debris; excavation; handling, storage, transportation, and disposal of all excavated material; all necessary temporary earth retention and other protection work; preparation of subgrades; pumping and dewatering as necessary; protection of adjacent property; backfilling; construction of fills and embankments; grading; and other appurtenant work.

1.2 GENERAL

- A. With reference to the terms and conditions of the construction standards for excavations set forth in OSHA "Safety and Health Regulations for Construction", Chapter XVII of Title 29, CFR, Part 1926, Contractor shall employ a competent person and, when necessary based on the regulations, a licensed professional engineer in the state where the earthwork is located, to act upon all pertinent matters of the work of this section.

1.3 SUBMITTALS

- A. Drawings and Data – General

- 1. Drawings, specifications, and data covering the proposed materials shall be submitted in accordance with the Submittals Procedures section.

- B. Temporary Excavation Design Certificate

- 1. Before starting construction on the temporary excavation and in accordance with OSHA requirements enumerated above, the Contractor shall ensure that the temporary excavation design engineer shall complete and submit to Engineer the Temporary Excavation Design Certificate, Figure 1-31 23 11 and the Contractor shall use the temporary excavation design. If required by the OSHA requirements enumerated above or to protect existing facilities, the Contractor is responsible for ensuring that a separate certificate shall be submitted for each unique design. Refer to paragraph in this specification titled, "Temporary Excavations."

- C. Filter Fabric Data

- 1. Complete descriptive and engineering data for the fabric shall be submitted in accordance with the Submittals Procedures section. Data submitted shall include:
 - a. A 12 inch square sample of fabric.
 - b. Manufacturer's descriptive product data.

Excavation and Fill for Structures

- c. Installation instructions.

D. Test Results for Review of Materials

- 1. Complete test results for tests performed on fill and backfill, and other material specified herein, by an independent commercial laboratory retained by the Contractor, as described in the paragraph titled, "Review of Materials".

E. CLSM Mix Design

- 1. Mix design by independent commercial laboratory retained by the Contractor.

1.4 INSURANCE

- A. Professional Liability insurance shall be provided as specified in the Supplementary Conditions.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Filter Fabric

- 1. Filter fabric shall be provided in rolls wrapped with covering for protection from mud, dirt, dust, and debris.

2. Filter Fabric Type A

- a. Filter fabric Type A shall be provided for installation at locations indicated on the Drawings and as specified herein. Filter fabric Type A shall be a non-woven fabric consisting of only continuous chains of polypropylene filaments or yarns of polyester formed into a stable network by needle punching. The fabric shall be inert to commonly encountered chemicals; shall be resistant to mildew, rot, ultraviolet light, insects, and rodents; and shall have the indicated properties (Minimum average roll value in weakest principal direction):

- 1) Property – Grab Strength
 - a) Test Method : ASTM D4632
 - b) Unit : lbs Min Roll Value : 160
- 2) Property – Grab Elongation
 - a) Test Method : ASTM D4632
 - b) Unit : percentMin Roll Value : 50
- 3) Property – CBR Puncture Strength
 - a) Test Method : ASTM D6241
 - b) Unit : lbs Min Roll Value : 410
- 4) Property – Trapezoidal Tear
 - a) Test Method : ASTM D4533
 - b) Unit : lbs Min Roll Value : 60
- 5) Property – UV Resistance at 500 hours
 - a) Test Method : ASTM D4355

Excavation and Fill for Structures

b) Unit : % Strength Retained Min Roll Value : 70

- b. The apparent opening size (diameter) for the filter fabric Type A shall be no larger than the U.S. Standard Sieve Size 70 per ASTM D4751.

B. Polyethylene Film

1. Polyethylene film beneath concrete slabs or slab base course material shall comply with requirements of ASTM D4397, 6 mil minimum thickness.

C. Fill and Embankment Materials

1. To the maximum extent available, excess suitable material obtained from structure and trench excavation shall be used for the construction of site fills and embankments. Additional material shall be provided from Contractor's offsite source.
2. All material placed in fills and embankments shall be free from rocks or stones larger than 3 inches in their greatest dimension, brush, stumps, logs, roots, debris, and other organic or deleterious materials. No rocks or stones shall be placed in the upper 18 inches of any fill or embankment. Rocks or stones within the allowable size limit may be incorporated in the remainder of fills and embankments, provided they are distributed so that they do not interfere with proper compaction.

D. Granular Fill

1. Granular fill material shall be crushed rock or gravel suitable for use as a free draining subbase beneath slabs and foundations. Granular fill shall be free from dust, clay, and trash; hard, durable, non-friable; and shall be graded 3/4 inch to No. 4 as defined in ASTM C33 for No. 67 coarse aggregate. Granular fill shall meet the quality requirements for ASTM C33 coarse aggregate. The edges of granular fill shall be confined, either by placing against an excavation face or other fill.

E. Structure Backfill

1. Structure backfill shall be defined as the material placed around and outside of structures. For structures constructed in open excavations, structure backfill shall extend to the temporary excavation slope so that the entire excavation outside the structure shall be filled with structure backfill. For structures constructed in supported excavations, the structure backfill shall completely fill the space between structure and temporary earth retention, or between structure and excavation face, if these specifications permit removal of the system. Structure backfill shall meet the requirements of the previous paragraph entitled "Fill and Embankment Materials", unless the Drawings indicate crushed rock or clean sand structure backfill is to be used.
2. Crushed Rock Structure Backfill
- a. Crushed rock for structure backfill shall meet the gradation and quality requirements of NCDOT Standard Specifications for Roads and Structures, Section 1005, aggregate Standard Size #ABC.

F. Select Fill

1. Select fill shall be defined as the material placed beneath the structure foundations and slabs below any granular material layer or lean concrete slab indicated on the Drawings. Select fill shall be used to replace any unsuitable material below the structure foundations and slabs and to raise the site grades below and within 5 feet horizontally (unless a different dimension is otherwise indicated on the Drawings or specified) of structural footprints and at locations indicated on the Drawings. Select fill shall meet the requirements of the previous paragraph entitled "Fill and Embankment Materials", unless the Drawings indicate crushed rock or clean sand select fill is to be used.
2. Crushed Rock Select Fill
 - a. Crushed rock for select fill shall meet the following gradation and quality requirements of NCDOT Standard Specifications for Roads and Structures, Section 1005, aggregate Standard Size #ABC.

G. Gravel Base Beneath Slabs

1. "Gravel Base Beneath Slabs" is defined as material to be placed directly beneath building floor slabs as shown on the Drawings. The material shall meet the quality requirements specified for ASTM C33 concrete coarse aggregate and shall be graded No. 7 coarse aggregate.

H. Controlled Low Strength Material (CLSM)

1. CLSM shall consist of a mixture of Portland cement, fly ash, sand, and water and shall be placed at locations indicated on the Drawings or as directed by Engineer. The class of CLSM shall be as specified below.
2. The type of cement in CLSM shall be ASTM C150 Type I or Type 1L. The class of fly ash in CLSM shall be ASTM C618 Class C ASTM C618 Class F, except loss on ignition shall not exceed 4 percent. Fine aggregate in CLSM shall be clean natural sand, ASTM C33, except that clay particles shall not exceed one percent. Water in CLSM shall be potable.
3. Contractor shall design and test the CLSM. The mix design shall be such as to ensure that the CLSM hardens sufficiently to support the weight of an average person in one to four hours after placement and support equipment weight in 24 hours. The mixture shall be designed such that when tested in the field with the Kelly Ball apparatus per ASTM D6024, the maximum depression diameter shall be 3 inches. CLSM shall be self-leveling and shall have an average patty diameter from 8 to 12 inches when the flow is measured in accordance with ASTM D6103.
4. The batch proportions accepted by Engineer apply only for materials from the same source and having the same characteristics as the materials used in the mix design. Materials from any other source shall be used only with the acceptance of Engineer.
5. If a change in sources of materials is proposed, a new mix design shall be developed by Contractor before the new material is used. When unsatisfactory results or other conditions make it necessary, Contractor shall develop a new mix design to get the desired results.

Excavation and Fill for Structures

6. During the progress of the work, no change shall be made in the batch proportions of the ingredients without the acceptance of Engineer.
7. Class C CLSM
 - a. The initial trial mixture for Class C CLSM shall consist of the following minimum proportions per cubic yard to provide minimum compressive strength listed below:
 - 1) Cement : 80 lbs
 - 2) Fly Ash : 275 lbs
 - 3) Sand (SSD) : 2795 lbs
 - 4) Water : 370 lbs
 - 5) Air Entraining Agent : 4 percent
 - 6) Minimum compressive strength at 28 days : 370 psi

I. Geocomposite Sheet Drains

1. The geocomposite sheet drains shall consist of a continuous plastic three dimensional drainage core wrapped on one side in a non-woven filter fabric permeable to water flow. The filter fabric shall be bonded to the individual dimples of the molded plastic core to minimize fabric intrusion into the flow channels caused by the backfill pressure. The fabric shall extend beyond the edges of the core to provide overlap for the adjacent panels. The geocomposite sheet drain shall be CCW-MIRADRAIN 6000XL as manufactured by CARLISLE, or SITEDRAIN Sheet 186 as manufactured by American Wick Drain Corporation, or equal.

2.2 MATERIAL TESTING

A. Review of Materials

1. As stipulated in the Quality Control section, all tests required for preliminary review of materials and materials delivered to the Site shall be made by an acceptable independent testing laboratory at the expense of Contractor. Tests performed by the aggregate supplier are not acceptable. Tests shall have been performed within 2 months of submittal and shall be representative of the material that will be delivered to the Site. Acquisition of samples for testing, both for preliminary review of materials and for testing of materials at the Site, shall be by the Contractor's independent testing laboratory. Samples acquired at the Site shall be obtained after placement and compaction of the material. Aggregate material shall be sampled in accordance with ASTM D75.
2. Two initial gradation tests shall be made for each type of general fill, select fill, structure backfill, granular fill, or other specified material, and one additional gradation test shall be made for each additional 500 tons of each material delivered (imported) to the jobsite or suitable onsite material incorporated in select fill or structure backfill. One additional gradation test shall be performed for each additional 2,000 tons of general fill material delivered to the jobsite or suitable onsite material incorporated in general fill. In addition, one set of initial Atterberg Limits test shall be made for each fill material containing more than 20 percent by weight pass the No. 200 sieve and for materials specified by Atterberg Limits. One additional Atterberg Limits test shall be made for each additional 500 tons of each material delivered to the job site or otherwise incorporated in select fill or structure backfill. One additional Atterberg Limits test shall

Excavation and Fill for Structures

be made for each additional 2,000 tons of general fill material delivered to the jobsite or suitable onsite material incorporated in general fill.

3. All material testing on CLSM shall be made by an independent testing laboratory at the expense of Contractor.

B. Field Testing Expense

1. All moisture-density (Proctor) tests and relative density tests on the materials, and all in-place field density tests, shall be made by an independent testing laboratory at the expense of Owner. Contractor shall provide access to the materials and work area and shall assist the laboratory as needed in obtaining representative samples.

C. Required Field Tests

1. For planning purposes, the Owner's testing laboratory will use the following general guidelines for frequency of field tests. Additional tests will be performed as necessary for job conditions and number of failed tests.
 - a. For area fills and embankments, an in-place field density and moisture test for each 1000 cubic yards of material placed.
 - b. One in-place field density and moisture test for every 100 to 200 cubic yards of structure backfill or select fill.
 - c. One in-place density and moisture test whenever there is a suspicion of a change in the quality of moisture control or effectiveness of compaction.
 - d. At least one test for every full shift of compaction operations on mass earthwork.
 - e. Testing of CLSM will be as follows.
 - 1) Compressive Strength. For every 200 cubic yard of CLSM placed, prepare, cure, remove from molds, and test four 6 by 12 inch test cylinders in accordance with ASTM D4832. Cure cylinders in the molds in accordance with ASTM D4832 until time of testing, at least 14 days. Two cylinders will be tested at 7 days and the other two cylinders will be tested at 28 days.
 - 2) Flow. Once each day, the CLSM material will be tested for flow in accordance with ASTM D6103.
 - 3) Unit Weight, Yield, and Air Content. Once each day that flowable fill is placed, unit weight, yield and air content will be determined in accordance with ASTM D6023.
 - 4) Penetration. Once a day that CLSM is placed, the resistance to penetration from ball-drop apparatus (Kelly Ball) will be measured in accordance with ASTM D6103. (Compliance will be based on maximum depression diameter of 3 inches.)

PART 3 - EXECUTION

3.1 SITE PREPARATION

- A. All sites to be occupied by permanent construction or embankments shall be cleared of all logs, trees, roots, brush, tree trimmings, and other objectionable materials and debris. All stumps shall be grubbed. Subgrades for fills and embankments and sites to be occupied by permanent

construction shall be cleaned and stripped of all surface vegetation, sod, and organic topsoil. All waste materials shall be removed from the site and disposed of by and at the expense of Contractor.

3.2 EXCAVATION

A. General

1. Permanent excavations shall conform to the lines and grades indicated on the Drawings. Temporary excavations shall provide adequate working space and clearances for the work to be performed therein and for installation and removal of concrete forms. In no case shall excavation faces be undercut for extended footings.
2. Subgrade surfaces shall be clean and free of loose material of any kind when concrete is placed thereon.

B. Temporary Excavations

1. Except where excavation side slopes are cut to a stable slope, excavations for structures and trenches shall be supported as necessary to prevent caving or sliding. Temporary earth retention systems shall be furnished and installed as necessary to limit the extent of excavations for the deeper structures and necessary backfill under adjacent shallower structures, and to protect adjacent structures and facilities from damage due to excavation and subsequent construction.
2. Design of excavations by a professional engineer retained by Contractor is required when necessary to protect adjacent existing facilities, or when design by an engineer is required by the OSHA regulations cited herein. The Contractor's professional engineer shall be licensed in the state of the Project and is responsible for design of entire excavation (both the sloping and supported portions of the excavation). The design of temporary earth retention shall comply with the paragraph of this specification titled, "Temporary Earth Retention."
3. Before starting construction on a temporary excavation requiring design by a professional engineer in compliance with requirements of this specification (to protect existing structures, utilities, and other facilities), the Contractor shall ensure that the temporary excavation design engineer shall complete the Temporary Excavation Design Certificate (Figure 1 – 02200) and the Contractor shall submit the certificate along with proof of professional liability insurance for the temporary excavation designer. The Contractor shall use the temporary excavation design. The Contractor shall submit a separate certificate for each unique design.

C. Classification of Excavated Materials

1. No classification of excavated materials will be made for payment purposes. Excavation and trenching work shall include the removal and subsequent handling of all materials excavated or otherwise removed in performance of the work, regardless of the type, character, composition, or condition thereof.

D. Preservation of Trees

Excavation and Fill for Structures

1. No trees shall be removed outside excavated or filled areas, unless their removal is authorized by Owner. Trees left standing shall be adequately protected from damage by construction operations.

E. Unauthorized Excavation

1. Except where otherwise authorized, indicated, or specified, all materials excavated below the bottom of concrete walls, footings, slabs on grade, and foundations shall be replaced with concrete or lean concrete at the expense of Contractor. If structural concrete replacement is chosen, it shall be with concrete placed at the same time and monolithic with the concrete foundation.

F. Blasting

1. Blasting or other use of explosives for excavation will not be permitted.

G. Dewatering

1. Dewatering equipment shall be provided to remove and dispose of all surface water and groundwater and all water, regardless of the source, entering excavations, trenches, or other parts of the work. Each excavation shall be kept dry during subgrade preparation and continually thereafter until the structure to be built, or the pipe to be installed therein, is completed to the extent that no damage from hydrostatic pressure, flotation, or other cause will result.
2. All excavations for concrete structures or trenches which extend down to or below groundwater shall be dewatered by lowering and keeping the groundwater level to the minimum depth of 12 inches, beneath such excavations. The specified dewatering depth shall be maintained below the prevailing bottom of excavation at all times.
3. Surface water shall be diverted or otherwise prevented from entering excavations or trenches to the greatest extent possible without causing damage to adjacent property.
4. Contractor shall be responsible for the condition of any pipe or conduit used for drainage purposes, and all such pipe or conduit shall be left clean and free of sediment.

H. Temporary Earth Retention

1. Temporary excavations shall be supported with temporary earth retention systems when excavation side slopes cannot be excavated to a stable slope.
2. If the soldier pile and lagging method is used for temporary earth retention, the soldier piles shall be installed by drilling. The lagging shall be seasoned hardwood, with maximum board width (vertical height) of 12 inches. The lagging boards shall be installed from the top down as the excavation advances.
3. The use of the following devices or systems are prohibited for use as temporary earth retention systems when the retention system is required to limit ground movement to protect structures, utilities, and other adjacent facilities.
 - a. soldier piles with plate lagging

Excavation and Fill for Structures

- b. slide rail systems
 - c. trench shields i.e. trench boxes (trench shields are considered worker protection only, not temporary earth retention systems)
- 4. The above prohibition does not prevent Contractor from using soldier piles with plate lagging, slide rail systems, and trench shields to protect workers in an excavation.
 - 5. Excavation support systems and sheeting and shoring shall be all removed after completion of work.
 - 6. Unless the excavation support is required to be left in place the design of the excavation support system shall be such as to permit complete removal while maintaining safety and stability in the excavation at all times. Excavation support systems to be left in place shall be designed and constructed of only steel. No additional payment above the Contract Price will be made for excavation support components left in place. Excavation support elements left in place, shall be cut off 24 inches minimum below the finish grade indicated on the Drawings.

I. Foundation Subgrade Preparation

- 1. Subgrades for foundations shall be prepared using the same procedure as required for fills and embankments. After preparation, foundation subgrades shall be firm, dense, and thoroughly compacted and consolidated; and shall be sufficiently stable to remain firm and intact under the feet of the workers. Reinforcing steel and concrete shall be placed as soon as possible after subgrade preparation. Subgrades that are disturbed due to weather or other conditions shall be repaired by removing the disturbed material and replacing with crushed rock select fill. Subgrade surfaces shall be clean and free of loose material of any kind when concrete is placed thereon.

J. Roadway Excavation

- 1. Excavation for the roadways, drives, and parking areas shall conform to the lines, grades, cross sections, and dimensions indicated on the Drawings and shall include the excavation of all unsuitable material from the subgrade. After shaping to line, grade, and cross section, the subgrade shall be compacted to a depth of at least 6 inches [150 mm] and shall meet the following:
 - a. Test method to determine maximum density and moisture : ASTM D698.
 - b. Relative compaction and moisture content relative to the optimum : 95%.
 - c. Moisture content relative to the optimum : -2% to +2%.
- 2. This operation shall include any reshaping and wetting or drying required to obtain proper compaction. All soft or otherwise unsuitable material shall be removed and replaced with suitable material.

3.3 FILLS AND EMBANKMENTS

- A. Fills and embankments shall be constructed to the lines and grades indicated on the Drawings. Fills and backfills placed beneath and around structures shall comply with the requirements of this specification for select fill and structure backfill, respectively. Construction of fills and

embankments shall begin from the lowest elevation in each excavation or area and progress upward. Materials shall be deposited in approximately horizontal layers not to exceed 8 inches in uncompacted thickness. Unless otherwise specified herein, the following governing standards apply:

1. Test method to determine maximum density and moisture : ASTM D698.
 2. Relative compaction : 95%.
 3. Moisture content relative to the optimum : -2% to +2%.
- B. Where new fill is placed adjacent to an existing sloping surface steeper than 5 horizontal to 1 vertical, the existing slope shall be benched in advance of placement of new fill. The bench shall be of sufficient width to allow compaction of the junction between the new fill and existing earth surface.
- C. Backfilling of excavations and construction of fills and embankments during freezing weather shall not be done. No backfill, fill, or embankment materials shall be installed on frozen surfaces, nor shall frozen materials, snow, or ice be placed in any backfill, fill, or embankment.
- D. Subgrade Preparation
1. After preparation of the fill or embankment site, the subgrade shall be scarified and moisture conditioned to a minimum depth of 6 inches , leveled and compacted to the same relative compaction and moisture content relative to optimum as specified for fill.
 2. Unless otherwise directed by Engineer, the subgrade shall be proof-rolled by a rubber-tired roller, a loaded dump truck, or other suitable rubber-tired equipment acceptable to Engineer. A minimum of four passes of the proof-rolling equipment shall be provided such that the last two passes are made perpendicular to the first two passes.
 3. All soft, yielding, or otherwise unsuitable material shall be removed and replaced with compacted fill.
- E. Placement and Compaction
1. All fill and embankment materials shall be placed in approximately horizontal layers not to exceed 8 inches in un-compacted thickness. Material deposited in piles or windrows by excavating and hauling equipment shall be spread and leveled before compaction.
 2. Each layer of material shall have the best practicable moisture content for satisfactory compaction. The material in each layer shall be wetted or dried to achieve the moisture content relative to optimum as specified above, and shall be thoroughly mixed to ensure uniform moisture content and adequate compaction. Each layer shall be thoroughly compacted to the required degree of compaction at the required moisture content. If the material fails to meet the density specified, compaction methods shall be altered. The changes in compaction methods shall include, but not be limited to, changes in compaction equipment, reduction in uncompacted lift thickness, increase in number of passes, and better moisture control.

3. Wherever a pipe is to be installed within a fill or embankment, the fill or embankment material shall be placed and compacted to an elevation not less than 12 inches above the top of pipe elevation before the trench for pipe installation is excavated.
4. Fills and embankments over reservoir or basin roof slabs shall be placed and compacted by using methods that will not damage or overload the structure; compaction in addition to that attained by placement operations will not be required. Rubber-tired equipment shall be used insofar as possible. Individual items of equipment operated on reservoir or basin roof slabs shall not have loaded weight in excess of 14,000 lbs and shall be so operated that no impact loads are imposed on the structure. Fill material shall not be piled on the roof slab to a depth greater than 12 inches above finished grade elevation. Fill construction shall begin at the walls, and construction equipment shall operate on a layer of fill material at least 12 inches deep. Special care shall be taken to avoid damaging or disturbing any roofing membrane, tile drains, or granular fill material.

F. Borrow Pits

1. Borrow pits are not permitted.

3.4 FILL AND BACKFILL FOR STRUCTURES

- A. Earth and aggregate materials placed for structures include granular fill, structure backfill, select fill, gravel base beneath slabs, and controlled low strength material. In addition to the specific requirements specified herein, all requirements for placement of fills and embankments shall apply to granular fill, structure backfill, select fill, and gravel base beneath slabs. These requirements include, but are not limited to subgrade preparation, lift thickness, and moisture conditioning requirements. All fills and backfills for structures shall be constructed to the lines and grades indicated on the Drawings. Backfilling and construction of fills during freezing weather shall not be done. No backfill, fill, or embankment materials shall be installed on frozen surfaces, nor shall frozen materials, snow, or ice be placed in any backfill, fill, or embankment.

B. Granular Fill

1. Granular fills shall be provided where indicated on the Drawings. Granular fills shall be placed on suitably prepared sub-grades in uncompacted lift thickness of 6 inches or less and compacted by vibration. Granular fills shall be compacted to not less than 70 percent relative density as determined by ASTM D4253 and D4254. If the thickness of the granular fill is less than 6 inches, the compaction shall be by a minimum four passes (round trips) of a self-propelled or walk-behind type vibratory roller operating in full vibration mode in accordance with manufacturer's instructions.
2. Where granular fills are to be covered with concrete, the top surface shall be graded to the required sub-grade elevation. The completed fill shall be covered by polyethylene film.

C. Structure Backfill

1. Backfill materials shall be deposited in approximately horizontal layers not to exceed 8 inches in uncompacted thickness and shall meet the following requirements:

Excavation and Fill for Structures

- a. Test method to determine maximum density and moisture : ASTM D698.
 - b. Relative compaction : 95%.
 - c. Moisture content relative to the optimum : -2% to +2%.
2. Compaction of structure backfill shall be performed in such a manner that damage to the structure is prevented. The compaction equipment used within 8 feet of the walls and for the top 8 feet [2.4 m] of backfill shall be of the appropriate type for the soil or aggregate being compacted. Limit of equipment weight shall be 1 ton . Compaction of structure backfill by inundation with water will not be permitted.
3. No backfill shall be deposited or compacted in water.
4. Care shall be taken to compact structure backfill which will be beneath pipes, drives, roads, parking areas, walks, curbs, gutters, or other surface construction or structures. In addition, wherever a pipe is to be installed within structure backfill, the structure backfill shall be placed and compacted to an elevation not less than 12 inches above the top of pipe before the trench for pipe installation is excavated. Compacted areas, in each case, shall be adequate to support the item to be constructed or placed thereon.

D. Select Fill

1. Select fill shall be placed in approximately horizontal layers in uncompacted lift thickness of 8 inches or less and shall meet the following requirements:
 - a. Test method to determine maximum density and moisture : ASTM D698.
 - b. Relative compaction : 95%.
 - c. Moisture content relative to the optimum : -2% to +2%.

E. Gravel Base Beneath Slabs

1. The gravel base beneath building floor slabs shall be placed in uncompacted lift thickness of 6 inches or less and compacted with a minimum of four passes (round trips) of a self-propelled or walk-behind type vibrating roller. The roller shall be operated in the full vibrating mode and in accordance with the manufacturer's instructions.

F. Controlled Low Strength Material (CLSM) Fill

1. CLSM shall not be placed on frozen ground. Batching, mixing, and placing of CLSM may be started when weather conditions are favorable and when the temperature is at least 34°F and rising. At time of placement of CLSM the temperature shall be at least 40°F . Mixing and placing shall stop when the temperature is 38°F and falling. Each filling stage shall be as continuous an operation as is practicable.
2. CLSM shall be discharged from the mixer by an acceptable procedure into the area to be filled. CLSM shall be placed to limits indicated on the Drawings. Mixing CLSM with in-situ soil shall be avoided.
3. When CLSM is placed as backfill against structures, the fill shall be placed in lifts of 2 to 3 feet and the next lift shall not be placed until the previous lift can support the weight of workers without indenting the surface and at least 16 hours have elapsed from the end of

placement. Lift thickness shall be reduced as necessary to prevent floatation of the structure.

4. When CLSM is placed over culverts or pipelines, they shall be anchored to prevent flotation during the placement of CLSM. Unless otherwise required, CLSM shall be placed to one foot below the finished grade elevation if the finished grade elevation is not more than 5 feet over the top of the culvert or pipe. If the finished grade is more than 5 feet over the top of the culvert or pipe, CLSM shall be placed to an elevation 2 feet over the top of the culvert or pipe, and the remainder shall be backfilled with the specified backfill or as indicated on the Drawings.

3.5 FILTER FABRIC INSTALLATION

- A. Filter fabric shall be placed as specified herein and at the locations specified or otherwise indicated on the Drawings.
- B. Filter fabric shall be protected from contamination by foreign material and damage. Any contaminated or damaged filter fabric shall be replaced with new filter fabric at no additional cost to the Owner. The fabric shall be covered within 7 calendar days after placement.
- C. The subgrade for placement of filter fabric shall be smooth and free of irregularities and undulations. Filter fabric shall be laid smooth and free of tension, stress, folds, wrinkles, or creases. Type A and B filter fabric shall be overlapped a minimum of 2 feet between adjacent roll ends and adjacent strips.
- D. The joints of Type C filter fabric shall be sewn unless otherwise recommended by the manufacturer for the specific application. All seams shall be formed by mating the edges of the filter fabric panels and sewing them together with continuous stitches located a minimum of three inches from the edges. The thread shall be ultraviolet light resistant and manufactured from the same material as the filter fabric. A two-thread, type 401 double-lock stitch shall be used for all sewn work. Sewing methods shall conform to the latest procedures recommended by the filter fabric manufacturer. The Contractor shall demonstrate that the seam efficiency meets the requirements of the specified tabulated properties for the filter fabric as applicable.
- E. All filter fabric placed shall be fixed to the subgrade to prevent filter fabric slippage or movement during placement of subsequent materials. Pins or staples shall not be used to fix the filter fabric to the subgrade when a geomembrane is to be placed on top of the filter fabric.
- F. The Contractor shall exercise care during filter fabric installation to prevent damage to the prepared supporting subgrade surface. The Contractor shall exercise care to prevent the entrapment of rocks, clods of earth or other material which could damage the filter fabric, clog the filter fabric or hamper seaming. Filter fabric damaged or distressed by foreign objects shall be repaired or replaced.
- G. No foot traffic will be allowed on the filter fabric except with approved smooth-sole shoes. The Contractor shall not use the filter fabric surface as a work area or storage area for tools and supplies.
- H. Tracked or rubber tired construction equipment shall not be operated directly upon the filter fabric until a minimum thickness of 6 inches of the cover material is placed over the filter

fabric. Turning of construction vehicles shall be minimized to avoid distorting or damaging the filter fabric. All damaged filter fabric shall be replaced at Contractor's expense.

3.6 GEOCOMPOSITE SHEET DRAINS INSTALLATION

- A. The prefabricated geocomposite sheet drains shall be placed on buried structure walls as indicated on the Drawings. The fabric shall extend beyond the edges of the core to provide overlap for the adjacent panels. Before beginning the backfilling operations the geocomposite drains shall be permanently secured to the walls by means of an attachment system recommended by the sheet drain manufacturer. Adjacent sheet drain panels shall be joined as recommended by the manufacturer. Terminal edges of the sheet drain shall be covered by tucking the filter fabric flap behind the core. The bottom end of the sheet drain to be embedded in the granular drainage material shall have the plastic core exposed by peeling back the fabric a minimum of 3 inches but not so much as to expose the plastic core to intrusion and plugging by soil backfill. Backfill shall be placed and completed within 2 weeks of installation of the sheet drains.

3.7 FINAL GRADING AND PLACEMENT OF TOPSOIL

- A. After other outside work has been finished, and backfilling and embankments completed and settled, all areas which are to be graded shall be brought to grade at the indicated elevations, slopes, and contours. All cuts, fills, embankments, and other areas which have been disturbed or damaged by construction operations shall be surfaced with topsoil to a depth of at least 4 inches. Topsoil shall be of a quality at least equal to the existing topsoil in adjacent areas, free from trash, stones, and debris, and well suited to support plant growth. Any additional topsoil required to provide the required minimum thickness shall be at no additional cost to the Owner.
- B. Use of graders or other power equipment will be permitted for final grading and dressing of slopes, provided the result is uniform and equivalent to manual methods. All surfaces shall be graded to secure effective drainage. Unless otherwise indicated, a slope of at least 1 percent shall be provided.
- C. Final grades and surfaces shall be smooth, even, and free from clods and stones, weeds, brush, and other debris. Seeding and sod placement shall be in accordance with specification Section 02930.

3.8 DISPOSAL OF EXCAVATED MATERIALS

- A. Suitable excavated materials may be used in fills and embankments as needed. All excess excavated material shall be disposed of off site at the expense of Contractor.
- B. All debris, stones, logs, stumps, roots, and other unsuitable materials shall be removed from the site and disposed of by, and at the expense of, Contractor.

3.9 SETTLEMENT

- A. Contractor shall be responsible for all settlement of backfill, fills, and embankments which may occur within the correction period stipulated in the General Conditions.
- B. Contractor shall make, or cause to be made, all repairs or replacements made necessary by settlement within 30 days after notice from Engineer or Owner.

End of Section

This page intentionally left blank.

TEMPORARY EARTH RETENTION SYSTEM
DESIGN CERTIFICATE – Figure 1 – 31 23 11

I, the undersigned professional engineer hereby certify that the temporary earth retention system for excavation for _____ (structure or pipe description) has been designed by me, and is in compliance with the Contract Documents (which **includes a design that does not use a slide rail system or other preengineered manufactured system, or plate lagging**).

Name: _____

State of License: _____

Signature: _____

P.E. Number _____

Date: _____

(Seal)

This page intentionally left blank.

SECTION 40 61 11 - INSTRUMENTATION AND CONTROL SYSTEM

PART 1 - GENERAL

1.1 SCOPE

- A. This section covers the additions and modifications to an existing instrumentation and control system designated as the Plant Control System.
- B. The system shall be furnished as specified, complete with all software, human machine interface (HMI) hardware, input/output hardware, instrumentation, and all devices, accessories, appurtenances, testing, and training necessary for proper operation.
- C. The major components provided by the System Supplier shall include the following:
 - 1. Furnish and install a new enclosure for PLC-81, to be located within the new prefabricated drop-in enclosure serving Aeration Basins No. 1 and No. 2. The panel shall be UL certified and labelled. The internal components within the existing PLC-81 enclosure shall be relocated into the new enclosure for PLC-81 where possible.
 - 2. Furnish and install a new marshalling cabinet, to be located at the location of the existing PLC-81 enclosure. The panel shall be UL certified and labelled.
 - 3. Furnish and install a new enclosure for PLC-82, to be located within the new prefabricated drop-in enclosure serving Aeration Basins No. 3 and No. 4. The panel shall be UL certified and labelled. The internal components within the existing PLC-82 enclosure shall be relocated into the new enclosure for PLC-81 where possible.
 - 4. Furnish and install a new marshalling cabinet, to be located at the location of the existing PLC-82 enclosure. The panel shall be UL certified and labelled.
 - 5. Furnish and install a new enclosure for PLC-83, to be located within the new prefabricated drop-in enclosure serving Aeration Basins No. 5 and No. 6. The panel shall be UL certified and labelled. The internal components within the existing PLC-83 enclosure shall be relocated into the new enclosure for PLC-81 where possible.
 - 6. Furnish and install a new marshalling cabinet, to be located at the location of the existing PLC-83 enclosure. The panel shall be UL certified and labelled.
 - 7. Provide PLC and HMI programming and configuration for three new high temperature discrete input points related to packaged air conditioning units as shown on the Input/Output List.
 - 8. Coordinate with the Owner to identify and add the required monitoring points from the MCC-4B, MCC-5B, and MCC-P6B power metering packages via Ethernet/IP.
 - 9. Provide spare parts as specified.

10. Provide field services as necessary, including installation supervision and startup.

D. Associated Sections

1. This section also includes the equipment and services specified in the following sections.
Section 40 66 11 PROCESS CONTROL NETWORK SYSTEMS
Section 40 66 34 FIBER OPTIC COMMUNICATION CABLE AND EQUIPMENT
Section 40 67 11 PANELS, CONSOLES, AND APPURTENANCES

1.2 GENERAL

- A. Equipment furnished and installed under this section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with the Drawings, Specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by Engineer.

B. General Equipment Stipulations

1. The General Equipment Stipulations shall apply to all equipment and materials furnished under this section. If requirements in this specification differ from those in the General Equipment Stipulations, the requirements specified herein shall take precedence.

C. Drawings

1. The Drawings indicate locations and arrangements of equipment and may include installation details and block and one-line diagrams showing connections and interfaces with other equipment. The input/output (I/O) lists are attached as an appendix to this section.

D. Codes, Permits and Agency Approvals

1. All work performed and all materials used shall be in accordance with the National Electrical Code, and with applicable local regulations and ordinances. Where mandated by codes, panels, assemblies, materials, and equipment shall be listed by Underwriters' Laboratories. Contractor shall, as part of their work, arrange for and obtain all necessary permits, inspections, and approvals by the authorities having local jurisdiction of such work. This shall include any third-party inspections and testing of panels and equipment.

E. Supplier's Qualifications

1. Equipment and software furnished under this section and under other related sections listed in the Scope paragraph above shall be designed, coordinated, and supplied by a single manufacturer or supplier, hereinafter referred to as the System Supplier. The System Supplier shall be regularly engaged in the business of supplying computer-based monitoring, control, and data acquisition systems. The Contractor shall utilize the services of the System Supplier to coordinate all control system related items, to check-

out and calibrate instruments, and to perform all testing, training, and startup activities specified to be provided.

2. The System Supplier shall be CITI, INC, without exception.

F. Coordination

1. Systems supplied under this section shall be designed and coordinated by System Supplier for proper operation with related equipment and materials furnished by other suppliers under other sections of these specifications, under other contracts, and, where applicable, with related existing equipment. All equipment shall be designed and installed in full conformity with the Drawings, specifications, engineering data, instructions, and recommendations of the manufacturer, and the manufacturer of the related equipment.

G. Related Equipment and Materials

1. Related equipment and materials may include, but will not be limited to, instrumentation, motor controllers, valve actuators, chemical feeders, analytical measuring devices, conduit, cable, and piping as described in other sections or furnished under other contracts.

H. Device Tag Numbering System

1. All devices shall be provided with permanent identification tags. The tag numbers shall agree with System Supplier's equipment drawings and shall be as close as practical to the tag numbers used on the Drawings and device schedules. All field-mounted transmitters and devices shall have stamped stainless steel identification tags. Panel, subpanel, and rack-mounted devices shall have laminated phenolic identification tags securely fastened to the device. Hand-lettered or tape labels will not be acceptable.

1.3 GENERAL REQUIREMENTS

- A. The Drawings and Specifications indicate the extent and general arrangement of the systems. If any departures from the Drawings or Specifications are deemed necessary by System Supplier, details of such departures and the reasons shall be submitted to Engineer for review with or before the first stage submittal. No departures shall be made without prior written acceptance.
- B. The specifications describe the minimum requirements for hardware and software. Where System Supplier's standard configuration includes additional items of equipment or software features not specifically described herein, such equipment or features shall be furnished as a part of the system and shall be warranted as specified herein.
- C. Governing Standards
 1. Equipment furnished under this section shall be designed, constructed, and tested in accordance with IEEE 519, ANSI C37.90, FCC Part 15 - Class A, and NEMA ICS-1-109.60.
- D. Dimensional Restrictions

1. Layout dimensions will vary between manufacturers and the layout area indicated on the Drawings is based on typical values. The System Supplier shall review the Drawings, the manufacturer's layout drawings and installation requirements, and make any modifications requisite for proper installation subject to acceptance by Engineer. At least three feet of clear access space shall be provided in front of all instrumentation and control system components.

E. Workmanship and Materials

1. System Supplier shall guarantee all equipment against faulty or inadequate design, improper assembly or erection, defective workmanship or materials, and leakage, breakage, or other failure. Materials shall be suitable for service conditions.
2. All equipment shall be designed, fabricated, and assembled in accordance with recognized and acceptable engineering and shop practice. Individual parts shall be manufactured to standard sizes and thicknesses so that repair parts, furnished at any time, can be installed in the field. Like parts of duplicate units shall be interchangeable. Equipment shall not have been in service at any time prior to delivery, except for testing.

F. Corrosive Fluids

1. All parts which are exposed to corrosive conditions shall be made from corrosion resistant materials. System Supplier shall submit certification that the instrument manufacturer approves the selection of materials of primary elements that are in contact with the specified process fluid to be inert to the effects of the process fluid.

G. Appurtenances

1. Signal converters, signal boosters, amplifiers, special power supplies, special cable, special grounding, and isolation devices shall be furnished as needed for proper performance of the equipment.

1.4 SUBMITTALS

A. General

1. Complete dimensional, assembly, and installation drawings, wiring and schematic diagrams; and details, specifications, and data covering the materials used and the parts, devices and accessories forming a part of the system furnished, shall be submitted in accordance with the submittals section. Submittal data shall be grouped and submitted in three separate stages. The submittal for each stage shall be substantially complete. Individual drawings and data sheets submitted at random intervals will not be accepted for review. Equipment tag numbers or identifications used on the Drawings shall be referenced where applicable.

B. First Stage Submittal

1. The first stage submittal shall include the following items.
 - a. A detailed list of any exceptions, functional differences, or discrepancies between the

system proposed by System Supplier and this specification.

- b. Product catalog cut sheets on all hardware and software items, clearly marked to show the model number, optional features, and intended service of each device.
- c. A brief, concise description of the proposed system, including major hardware and software components and personnel training.
- d. A block diagram or schematic drawing showing the principal items of equipment furnished, including model numbers, and their interrelationships.
- e. Drawings showing floor and wall space or desktop area requirements for all equipment items, including allowances for door swings and maintenance access.
- f. Environmental and power requirements, including heat release information for each equipment item.
- g. Standard field termination drawings for all process input/output equipment, showing typical terminations for each type of point available in the system.
- h. Additional requirements identified in other Division 40 sections.

C. Second Stage Submittal

- 1. Before any equipment is released for shipment to the site and before factory testing is scheduled, the following data shall be submitted.
- 2. At System Supplier's option, the first and second stage submittals may be combined.
 - a. Complete panel fabrication drawings and details of panel wiring, piping, and painting. Panel and subpanel drawings shall be to scale and shall include overall dimensions, metal thickness, door swing, mounting details, weight, and front of panel arrangement to show general appearance, with spacing and mounting height of instruments and control devices.
 - b. Wiring and installation drawings for all interconnecting wiring between components of the system and between related equipment and the equipment furnished under this section. Wiring diagrams shall show complete circuits and indicate all connections. If panel terminal designations, inter-device connections, device features and options, or other features are modified during the fabrication or factory testing, revised drawings shall be submitted before shipment of the equipment to the site.
 - c. Fiber termination diagrams to show all fiber terminations at fiber patch panels and final termination at equipment. Fiber termination diagrams shall show individual fiber type (single or multimode), fiber core/cladding dimensions, fiber colors, circuit identifications, and type of terminator.
 - d. Review of drawings submitted prior to the final determination of related equipment shall not relieve System Supplier from supplying systems in full compliance with the specific requirements of the related equipment.

- e. Input/output listings showing point names, numbers, and addresses. Input/output identification numbers from the existing PLC as-built drawings shall be cross-referenced in this submittal.

D. Third Stage Submittal

- 1. Complete system documentation, in the form of Operation and Maintenance Manuals, shall be submitted before the commencement of field acceptance testing. Operation and Maintenance Manuals shall include complete instruction books for each item of equipment and software furnished. Where instruction booklets cover more than one specific model or range of device, product data sheets shall be included which indicate the device model number and other special features. A complete set of "as-built" wiring, fabrication, and interconnection drawings shall be included with the manuals. If field-wiring modifications are made after these drawings are submitted, the affected drawings shall be revised and resubmitted. Additional requirements are identified in other Division 40 specification sections.

1.5 PREPARATION FOR SHIPMENT

- A. All electronic equipment and instruments shall be suitably packaged to facilitate handling and to protect against damage during transit and storage. All equipment shall be boxed, crated, or otherwise completely enclosed and protected during shipment, handling, and storage. All equipment shall be protected from exposure to the elements, shall be kept dry at all times, and shall not be exposed to adverse ambient conditions.
- B. Painted surfaces shall be protected against impact, abrasion, discoloration, and other damage. Painted surfaces that are damaged prior to acceptance of equipment shall be repainted to the satisfaction of Engineer.
- C. Each shipment shall include an appropriate shipping list that indicates the contents of the package, including the specific instrument tags. The shipping list shall be accessible without exposing the instruments to the atmosphere. The shipping list shall also contain any cautionary notes regarding storage of the instruments, including requirements to protect the instrument from static discharge, desensitizing chemicals (solvents, paints, etc.), or ambient atmospheric conditions.
- D. Individual instruments shall be appropriately tagged or labeled to positively identify the device. All identification shall be visible without the need to unpack the instrument from its protective packaging.
- E. Instrument shipment and storage requirements shall be coordinated with Engineer or Owner prior to shipment. System Supplier shall provide adequate storage and be ready to accept the shipment before shipping any equipment to the site. Additional shipping and storage requirements shall be as detailed in the individual instrument specifications.
- F. Components which are shipped loose due to transportation limitations shall be assembled and disassembled by the manufacturer prior to shipment to assure that all components fit together and are adequately supported.

1.6 DELIVERY, STORAGE, AND SHIPPING

- A. Shipping shall be in accordance with the Product Delivery Requirements section. Handling and storage shall be in accordance with the Product Storage and Handling Requirements section.

1.7 SPARE PARTS

- A. Spare parts and consumable items are specified in other sections.
- B. Packaging
 - 1. All spare parts shall be delivered to Owner before final acceptance of the system. Packaging of spare parts shall provide protection against dust and moisture and shall be suitable for storage. Circuit boards and other electronic parts shall be enclosed in anti-static material. All packages shall be clearly marked with the manufacturer's name, part number or other identification, date of manufacture, and approximate shelf life.
- C. Replacement
 - 1. System Supplier may utilize spare parts and supplies during system installation, debugging, startup, or training, but shall restore all such materials and supplies to the specified quantities before final acceptance of the systems.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. All equipment furnished under each section referenced in SCOPE is a part of this section and shall be selected by System Supplier for its superior quality and intended performance. Equipment and materials used shall be subject to review.
- B. Standard Products
 - 1. The systems furnished shall be standard products. Where two or more units of the same type of equipment are supplied, they shall be the products of the same manufacturer; however, all components of the systems furnished hereunder need not be the products of one manufacturer unless specified herein.
 - 2. To the extent possible, instruments used for similar types of functions and services shall be of the same brand and model line. Similar components of different instruments shall be the products of the same manufacturer to facilitate maintenance and stocking of repair parts. Whenever possible, identical units shall be furnished.

2.2 PERFORMANCE AND DESIGN REQUIREMENTS

- A. The design of the systems furnished hereunder shall utilize concepts, techniques and features that provide maximum reliability and ease of maintenance and repair. The systems shall include

board-level devices such as light emitting diodes or other indicators to facilitate quick diagnosis and repair. Diagnostic software shall be furnished to facilitate system-level troubleshooting.

- B. Where redundant hardware is provided, the system shall be capable of performing all specified functions, without reconfiguring hardware or software, with only one device of each category in service.
- C. Factory Assembly
 - 1. Equipment shall be shipped completely factory assembled, except where its physical size, arrangement, configuration, or shipping and handling limitations make the shipment of completely assembled units impracticable.

2.3 POWER SUPPLY AND INSTRUMENT SIGNAL

- A. Power supply to all control system equipment will be 120 volts ac. System Supplier shall be responsible for distribution of power among enclosures, consoles, peripherals, and other components of the system from the power supply receptacles and junction boxes indicated on the Drawings. Power distribution hardware shall include cables and branch circuit overcurrent protection installed in accordance with the electrical section.
- B. Unless otherwise indicated, power supply to the instrumentation will be unregulated 120 volts ac. Unless otherwise indicated, all transmitted electronic analog instrument signals shall be 4-20 mA dc and shall be linear with the measured variable.
- C. Facility Distribution System
 - 1. Equipment not indicated to be powered from an uninterruptible power source shall be suitable for being supplied from the facility distribution system and shall be capable of withstanding voltage variations of ± 10 percent and harmonics up to the limits of IEEE 519 without affecting operation. System Supplier shall provide voltage conditioning or filtering equipment if necessary to meet the requirements specified.
- D. Power Supplies
 - 1. Power supplies for voltages other than those listed above shall be an integral part of the equipment furnished. Internal power supplies shall be regulated, current limiting, and self-protected.
- E. Surge Withstand
 - 1. All equipment shall meet all surge withstand capability tests as defined in ANSI C37.90 without damage to the equipment.

2.4 SERVICE CONDITIONS AND ENVIRONMENTAL REQUIREMENTS

- A. The equipment provided for the instrumentation and control system shall be suitable for the service conditions specified in the attached equipment sections.

Instrumentation and Control System

- B. All equipment shall be designed and selected to operate without degradation in performance throughout the environmental extremes specified. Equipment shall be designed to prevent the generation of electromagnetic and radio frequency interference and shall be in compliance with FCC Rules and Regulations, Part 15, for Class A computing devices.
- C. Ambient Temperature and Elevation
 - 1. All system equipment located in air conditioned rooms shall be suitable for operation in ambient temperatures from 10° C to 35° C and a relative humidity of 10 to 80 percent, noncondensing. All equipment located in non air conditioned indoor areas shall be suitable for an ambient temperature range of 0° C to 50° C and a relative humidity of 10 to 95 percent, noncondensing. All equipment located outdoors shall be suitable for operation in an ambient temperature range -20° C to 60° C and a relative humidity of 5 to 100 percent. Heaters and air conditioning/cooling equipment shall be provided where essential to maintain equipment within its manufacturer-recommended operating ranges.
 - 2. All equipment and instruments shall be designed to operate at the site elevation as indicated on the Meteorological and Seismic Design Criteria section.
- D. Deleterious Effects
 - 1. All system equipment will be installed in areas without anti-static floor construction and without any provisions for control of particulates or corrosive gases other than ordinary office-type HVAC filtering. System Supplier shall furnish any additional air cleaning equipment, anti-static chair pads, or other protective measures necessary for proper operation of the system.
 - 2. All input/output hardware shall meet or exceed, without false operation, all requirements of NEMA ICS-1-109.60, Electrical Noise Tests.
- E. Noise Level
 - 1. The equivalent "A" weighted sound level for any system equipment located in the control room, except printers, shall not exceed 35 dBA. The sound level for printers shall not exceed 65 dBA. Sound reduction enclosures shall be provided where necessary to comply with these limits.
- F. Lightning Protection
 - 1. In addition to other environmental protection specified herein, the entire system shall be provided with lightning protection. Lightning protection measures shall include the following.
 - 2. Grounding
 - a. All major components of the system shall have a low resistance ground connection. Grounding system provisions indicated on the Drawings shall be modified as recommended by System Supplier.
 - 3. Surge Suppressors

- a. Surge and lightning suppressors shall be non-faulting, non-interrupting, and shall protect against line-to-line and line-to-ground surges. Devices shall be solid-state metal oxide varistor (MOV) type, silicon junction type, Gas Discharge Tube (GDT) type, or some combination of these types, with a response time of less than 50 nanoseconds. Surge protective devices shall be applied for the following:
 - 1) All 120 volts ac power connections to RTUs, PLCs, DCUs, instruments and control room equipment. Surge arresters shall be Transtector "SPD 12R Series", Phoenix Contact "PLT-SEC Series", MCG Surge Protection "400 Series" or equal.
 - 2) All analog signal circuits where any part of the circuit is outside of the building envelope. Circuits shall be protected at both the transmitter and the control system end of the circuit. Surge protection devices shall not impede or interfere with the use of smart transmitter calibration/communication.
 - a) Protection devices located at the field transmitter shall be:
 - Loop Powered Transmitters – Eaton MTL "TP48", Phoenix Contact "Surge Trab Series", Transtector "PDS Outdoor Series" or equal.
 - Four-Wire Transmitters – Phoenix Contact "BoxTrab Series", Schneider Electric ASCO Model 265, Emerson "SolarHD STC-SLAC Series", or equal.
 - b) Protection devices in control panels shall be Transtector "12R IEP Series", Eaton MTL "SD Modular Series", Phoenix Contact "TTC-6P Series", or equal.
 - 3) All metallic pair (twisted and untwisted) conductor local area network and data highway termination points, where any part of the data highway cable is routed outside of the building envelope. Single-port protective devices shall be Phoenix Contact "DataTrab Series", Transtector "FSP" Series", Citel "MJ8 Series", Eaton MTL "NP Series", or equal.

PART 3 - EXECUTION

3.1 INSTALLATION REQUIREMENTS

- A. The installation of equipment furnished hereunder shall be by the Contractor or their assigned subcontractors.
- B. Field Wiring
 1. Field wiring materials and installation shall be in accordance with the electrical section.
- C. Salvage of Existing Equipment
 1. Existing equipment and materials removed or replaced under this contract shall be delivered to Owner at a location designated by Owner or shall be properly disposed of at Owner's discretion. Care shall be taken to avoid damage to equipment delivered to Owner.

2. Any mounting brackets, enclosures, conduits, wiring, or openings that remain after removal of equipment and support hardware shall be removed or repaired in a manner acceptable to Owner and Engineer.

3.2 SYSTEMS CHECK

- A. System Supplier shall provide the services of a trained and experienced field supervisor to assist the installation contractor during installation, and to calibrate, test, and advise others of the procedures for installation, adjustment, and operation.
- B. Field Inspection at Delivery
 1. The field supervisor shall inspect major equipment items within five working days of delivery, to assure that the equipment was not damaged during shipment and shall supervise or assist with unpacking, initial placement, and initial wiring of the system.
- C. Field Inspection Prior to Start Up
 1. After installation and wiring connections are complete, the field supervisor, with additional System Supplier's personnel shall verify that each external connection to the system is correctly wired and field process components and devices are functioning as intended. A minimum of four (4) working days shall be included for this task, but System Supplier shall be responsible for completing the following scope of work.
 2. Analog Signals
 - a. Analog input signals shall be simulated at the transmitting source and verified to be received at the proper register address in the control system. Analog outputs shall be generated at the control system, and verified to be received with the correct polarity, at the respective receiving device.
 3. Discrete Signals
 - a. Discrete input and output signals shall be simulated and verified that they are received at the respective receiving device, and at the proper voltage.
 4. Devices by Other Suppliers
 - a. If interrelated devices furnished by other suppliers, under other contracts, or by Owner, such as valve actuators, motor controls, chemical feeders, and instruments, do not perform properly at the time of system checkout, the field supervisor shall use suitable test equipment to introduce simulated signals to and/or measure signals from these devices to locate the sources of trouble or malfunction.
 5. System Check Out Report
 - a. The System Supplier shall submit a written report on the results of such tests to Engineer. Additional documentation shall be furnished as requested by Engineer to establish responsibility for corrective measures. System Supplier shall verify, in writing, to Engineer or Owner that System Supplier has successfully completed the

external connection check before beginning system startup or field acceptance testing.

D. Start Up Assistance

1. After the field supervisor has completed the system check and submitted the System Check Out Report, System Supplier shall supply a factory-trained engineer to provide on-site start up assistance. During the startup period, these personnel shall thoroughly check all equipment, correct any deficiencies, and verify the proper operation of all components. Two (2) working days shall be included for this task.

3.3 TESTING

A. The system shall be acceptance tested on site.

- B. System Supplier shall prepare a testing procedure to be approved by Owner and Engineer that shall demonstrate that the system conforms to the specifications. The testing procedure shall be submitted at least 30 days in advance of testing. The testing shall be conducted by System Supplier and witnessed by Owner and/or Engineer.

- C. System Supplier shall notify Engineer and Owner in writing at least 14 days before the proposed testing date. If the factory acceptance test is concluded unsuccessfully, the test shall be repeated. System Supplier shall reimburse Owner and Engineer for all expenses incurred in connection with attending repeated site testing necessitated by system failure or inadequate preparation.

D. Site Acceptance Testing

1. After installation and checkout by System Supplier's personnel, the system shall be subjected to an acceptance test. Site acceptance testing applies to all new PLC panels; testing can be scheduled in phases as required.
2. Site acceptance testing shall be scheduled after receipt of the System Check Out Report and System Supplier shall verify that all field signal changes are reflected in the proper address locations in the system database.
3. All basic functions shall be demonstrated, including I/O processing, communications, alarm handling, HMI display functions, alarm logging, report generation, and historical data storage, as well as the specific functions listed herein. The system shall operate continuously for at least 72 hours without faults. This operational test may run concurrently with the demonstration of hardware and software functions. The test procedure shall also include at a least four-hour period for discretionary tests to be conducted by Engineer or Owner.
4. The site acceptance testing shall operate without loss of basic functions. The number of working days of continuous operation for the test shall be seven (7). The operational demonstration shall confirm that the status, alarm, and process variable signals are valid and are being updated appropriately, and that the discrete and analog output signals from the control system are being correctly transmitted and implemented. Any errors or abnormal occurrences shall be recorded by System Supplier's field representative.

System Supplier's field representative need not be continuously present during the site acceptance testing but shall be available to respond to the site within one hour of notification. The representative shall inspect the system for faults at least once every 24 hours and shall log or record any noted problems. The log shall include a description of the problem, its apparent cause, and any corrective action taken.

5. Failure of Redundant Equipment

- a. Failure of redundant equipment shall not be considered downtime provided that automatic failover occurs as specified and, in the opinion of Engineer, the failure was not caused by deficiency in design or installation. In the event of repeated failure of any hardware component or software module, the acceptance test shall be terminated and re-started.

6. Completion of Test

- a. Successful completion of the site acceptance test, including the operational demonstration, is prerequisite to Substantial Completion as specified in the Supplementary Conditions.

End of Section

This page intentionally left blank.

40 61 11 S01 - Input/Output List - Legend/Description Sheet

Item. This is an arbitrary sequential number which is for reference only.
Type. This is the type of I/O signal, as follows:
AI = Analog Input
AO = Analog Output
DI = Discrete Input
DO = Discrete Output
Loop No. This is a sequential number for a given type within a specific controller.
Description. This is the description or the function (i.e. Filter 1 Loss-of-Head).
Field Device. This is the tag number of equipment identifier associated with the I/O point.
Controller ID. This is the panel identification for the I/O cabinet, PLC cabinet, or controller where the I/O signal terminates.
Analog Data (Signal Type). This will typically be 4-20mA, but could also be 1-5Vdc, serial, Network (Modbus TCP, MODBUS TCP/IP/IP), HART, BUS, or similar to indicate the signal type of the associated input or output.
Analog Data (Calibrated Range). This will be the scaled value of the input in engineering units.
Analog Data (Power). This will typically be '2-wire' for devices which are loop powered from the PLC enclosure, or '4-wire' for devices which are powered from external power supplies, unless noted otherwise.
Discrete Data (Signal Type). This will be 120VAC, 120VAC, or similar to indicate the signal type of the associated input or output.
Discrete Data (CLOSED State). This will indicate the state of the input or output when it is considered to be closed or energized (normal, alarm, running, failed, etc.).
Discrete Data (Power Source). This will indicate the location of the power source for the wetting voltage on the contacts, as follows:
Field = External field power source. (May require interposing relays or isolated I/O module type.)
PLC = Power originates from within the PLC or I/O enclosure.
Discrete Data (Interp Relay). This will be either 'Yes' or 'No' to indicate whether the input or output requires an interposing relay. Relays are typically required to isolate external voltage sources. See specifications for additional details.
Remarks. This column may include a cross reference to another specification section where applicable, or to a note which provides additional information. Notes are appended to the end of the I/O listing.

Item	Type	IO Code	Loop No.	Service Description	Field Device	Controller ID	Analog Data				Discrete Data				Remarks
							Signal Type	Calibrated Range	Power Type	Signal Type	CLOSED State	Power Source	Interp Relay		
1	DI	TAH	SEE NOTE	MCC-P4B PACKAGE AIR CONDITIONING UNIT HIGH TEMPERATURE	WPAC-104	PLC-81	N/A	N/A	N/A	24VDC	NORMAL	PLC	N/A	LOOP NUMBER AS RECOMMENDED BY I&C SYSTEM SUPPLIER	
2	DI	TAH	SEE NOTE	MCC-P8B PACKAGE AIR CONDITIONING UNIT HIGH TEMPERATURE	WPAC-105	PLC-82	N/A	N/A	N/A	24VDC	NORMAL	PLC	N/A	LOOP NUMBER AS RECOMMENDED BY I&C SYSTEM SUPPLIER	
3	DI	TAH	SEE NOTE	MCC-P8B PACKAGE AIR CONDITIONING UNIT HIGH TEMPERATURE	WPAC-106	PLC-83	N/A	N/A	N/A	24VDC	NORMAL	PLC	N/A	LOOP NUMBER AS RECOMMENDED BY I&C SYSTEM SUPPLIER	

This page intentionally left blank.



CITI SCOPE PROPOSAL 000053

Date: July 23, 2026

To: Bidding Contractors
90% Plans and Specifications
B&V Project No. 424744, July 2026

Project: BNR MCC Replacement Project
City of Raleigh, NC
Neuse River Resource Recovery Facility

CITI Inc. proposes to furnish the system integration materials and services described herein for the relocation of PLC-81, PLC-82, and PLC-83, including the installation of three new PLC enclosures and three new marshalling cabinets. This proposal is based on the 90% design documents and is subject to the clarifications, assumptions, and commercial terms contained herein. All work shall be performed in accordance with the scope described in this proposal and shall be governed exclusively by: (i) the CITI Inc. Master Terms and Conditions of Sale, available at www.citi-inc.com/Master-TCs, and (ii) the Supplemental T&Cs available at www.citi-inc.com/Supplemental-Seller-TCs (collectively, the "CITI Inc. Conditions of Sale").

Scope Summary: Provide and install three new PLC enclosures and three new NEMA 4X stainless steel marshalling cabinets; relocate and recommission reusable PLC components; provide new terminal blocks, analog surge protectors, internal wiring, and interconnecting cabling between the PLC enclosures and marshalling cabinets; support fiber optic and network relocation; integrate three new HVAC high-temperature alarm inputs (one per PLC), including PLC programming, HMI alarm updates, point-to-point checkout, and functional testing; and perform startup, testing, and commissioning for Power Centers P4, P5, and P6.

Materials

<u>Qty</u>	<u>Description</u>
3	NEMA 12, carbon-steel freestanding enclosures, nominal 72 in. H x 36 in. W x 24 in. D, with two hinged front doors not exceeding 18 in. wide each, removable gland/entry plates, recessed base, manufacturer standard finish, and panel-interior UPS provisions and new analog surge protectors. Enclosures are designated PLC-81, PLC-82, and PLC-83.
3	NEMA 4X, 316 stainless-steel cabinet, hinged front door, bottom conduit entry, terminal blocks, wire duct, grounding provisions, labels, and accessories. Cabinets are designated Cell A, Cell B, and Cell C Marshalling Cabinets.

Services

<u>Qty</u>	<u>Description</u>
1	Perform a pre-construction field verification at each power center to confirm existing panel dimensions, component layouts, conduit stub-ups, field cable quantities, available cable slack, fiber routing, power sources, grounding, and clearances before fabrication.
1	Create a shutdown request with detailed relocation and cutover plan for PLC-81, PLC-82, and PLC-83.
1	Develop point-to-point and cable schedules identifying existing field circuits, marshalling terminal assignments, new multicore/interconnection cables, PLC terminal destinations, and required analog/discrete segregation.
1	Coordinate Marshalling Cabinets Sizing and Terminations with Electrical Contractor



<u>Services</u>	
<u>Qty</u>	<u>Description</u>
1	Provide shop fabrication, internal assembly, wiring, labeling, inspection, and functional testing of the three new PLC enclosures and three marshalling cabinets.
1	Provide field services to de-energize, document, remove, relocate, reinstall, and reconnect reusable PLC panel components into the new PLC enclosures.
1	Preserve the existing fiber optic patch panel at each location where practical, install it in the new marshalling cabinet, and provide new multimode fiber patch cables to the Ethernet switch in the relocated PLC enclosure.
1	Coordinate and add required monitoring points from MCC-P4B, MCC-P5B, and MCC-P6B power-metering packages via EtherNet/IP, including PLC tag mapping, communications verification, and SCADA point coordination.
1	Perform I/O verification, loop checks, network communications testing, fiber testing, PLC power-up, UPS checks, and functional verification of all affected signals following each cutover.
1	Provide complete integration of three HVAC high-temperature alarms, one alarm from each new drop-in enclosure to the corresponding PLC (PLC-81, PLC-82, and PLC-83). CITI shall coordinate the alarm contact requirements, assign the appropriate loop/tag numbers, develop the required terminal and wiring details, provide and terminate the control wiring within the CITI-furnished marshalling and PLC enclosures, configure one new discrete input in each PLC, and update SCADA and PLC.
1	Provide final documentation.

SERVICE TASK	EST HRS
AD-GENERAL	16
SU-DESIGN	24
EN-PROJECT MANAGEMENT	36
EN-PLC PROGRAMMING	16
EN-SCADA PROGRAMMING	32
EN-GENERAL	0
FS-COMM NETWORKING SERVICES	48
FS-CONTROL PANELS	316
FS-GENERAL	200
ST-SHOP SERVICES	76

Service rate is \$147 per hour

CITI Pricing Summary

<i>Pricing for CITI scope of materials and services</i>	<i>Materials Subtotal =</i>	<i>\$ 96,094</i>
	<i>Services Subtotal =</i>	<i>\$103,200</i>
	<i>Total excluding taxes =</i>	<i>\$199,294</i>

CITI Clarifications:

1. The scope of this proposal excludes all of the following regardless of the specification responsibility statements:
 - Spare Parts;
 - Wiring installation between marshalling cabinets and PLC enclosures;
 - Installation services of marshalling cabinets and PLC enclosures;
 - Conduit installation, wire pulling, channel rack work, pullbox repairs, splicing outside CITI panels, grounding conductors and branch power;
 - 120 VAC branch circuit to each PLC or marshalling cabinets;
 - Materials not specifically listed in CITI Inc's scope;
 - Equipment mounting racks and stands, sensor support brackets, instrument and panel sunshades, support anchors and hardware, flange fitting accessory kits, pipe taps, isolation valves, sample pumps, sample piping, impulse piping, grounding wire and rods, stilling wells, etc. as may be required or shown on the contract drawings, unless specifically listed in CITI Inc's materials scope;
 - Local control panels not specifically listed in our scope;
 - PLC program development software licenses;
 - Demolition or relocation of existing instrumentation and controls equipment;
 - Electrical Services: Troubleshooting existing wiring in conduits
2. This proposal is based on the 90% plans and specifications dated July 2026. CITI reserves the right to revise scope and pricing following receipt and review of the final issued-for-bid/issued-for-construction documents.
3. The new PLC enclosures will be UL 508A labeled as newly fabricated industrial control panels. Relocation of existing listed components will be completed in accordance with the approved panel design and final UL requirements. Any field evaluation or third-party labeling beyond CITI shop UL 508A certification is excluded.
4. Existing PLC hardware, I/O modules, UPS equipment, network switches, power supplies, fiber patch panels, and other components are assumed serviceable and suitable for reuse. Replacement of failed, obsolete, damaged, or noncompliant existing equipment is excluded unless specifically identified.
5. All panels furnished under the scope of this proposal will be provided with the manufacturers' standard finish.
6. All materials are warranted for 18 months after delivery, 12 months after completion of their respective acceptance testing, or 12 months after the original project completion date, whichever occurs first. We will be responsible for shipping and repair costs for non-conforming or defective items during the warranty period. You will be responsible for removal, return shipment, receipt, and re-installation of any equipment items which you originally installed.
7. Materials will be released for manufacture and shipment to the job site upon receipt of the approved submittal and your authorization. After your authorization to release, you must accept deliveries when equipment is available. You must assume custody upon delivery and provide suitable facilities in accordance with the specifications for on-site storage until materials are installed and powered. CITI Inc's hardware submittals will be available within 8-10 weeks after receipt of an executed order. Materials should be fully deliverable within 12-16 weeks after approved submittals and in accordance with an agreed upon schedule that will be based on product availability and supply chain constraints. Delivery schedules are non-binding, and CITI Inc maintains the right to partial deliveries as materials become available. If the delivery of materials is delayed as a result of manufacturer supply chain issues or other factors beyond our control, CITI Inc shall not be liable for any additional costs or damages associated with such delays.
8. CITI Inc's insurance coverage is: general liability - \$1,000,000/\$2,000,000; auto liability - \$1,000,000; excess liability - \$1,000,000; and workers compensation - \$1,000,000. If any



- additional coverage or endorsements are required, the charges for additions to CITI Inc's policy will be charged to you as an extra expense at actual cost times a multiplier of 1.15.
9. CITI Inc will retain all rights to Intellectual Property developed under this project and will grant the end user non-transferable rights to its use and modification. A copy of CITI Inc's privacy statement is available at www.CITI-INC.com.
 10. This proposal is valid for 60 days. However, due to potential cost increases resulting from newly imposed import tariffs affecting our vendor suppliers, CITI Inc. reserves the right to adjust selling prices accordingly before receiving an executed purchase order and authorization for the release of materials for manufacturing and delivery. Shipping terms are FOB factory, with freight costs allowed. Unless otherwise specified in this proposal, all shipments will be directed to the designated project site.
 11. Payment terms for this project are **net 30 days**, contingent upon approved credit, after the date of each invoice. Payment to CITI Inc shall not be dependent on your receipt of payment from any third parties. Materials that are delivered or approved for storage in CITI Inc's facility will be billed complete at the time of delivery/storage in accordance with a pre-submitted schedule of values. Services will be billed based on the percentage completed against this schedule of values.
 12. CITI Inc will accept retainage being withheld from progress payments due to CITI if the Owner is applying retainage against the prime contract. Five percent retainage may be withheld until CITI Inc's work is 50% complete by approved billings, after which 0% may be withheld. Partial and full retainage releases must be made within the earlier of: seven days of Owner's payment of retainage to you; or 60 days from the completion of CITI Inc's scope of work.
 13. CITI Inc will not provide any materials or services for this project prior receipt of an executed purchase order.
 14. CITI Inc will accept a purchase order for this scope of supply subject to these clarifications and the attached CITI Inc "Conditions of Sale". A subcontract will not be accepted. The order will need to incorporate this proposal or specifically include within its body the listing of materials, services, and clarifications from this proposal so as to define CITI Inc's scope of supply and terms. Flow down clauses will not be accepted. All terms of CITI Inc's agreement must be specifically listed in the order. Assignment of order is subject to CITI Inc's written consent.
 15. CITI Inc will apply taxes to all invoices for labor and materials as applicable. If a tax exemption is being claimed, all relevant exemption forms must be provided to CITI at the time the purchase order is issued. A completed NCDOR E-589CI Affidavit of Capital Improvement is needed if the work is to be taxed as a real property contract with respect a capital improvement to real property.

If you have any questions about this scope of supply, please call us. Thank you for your consideration.

CITI Inc.

A handwritten signature in black ink, appearing to read "Leonardo Jurado", written over a light blue circular stamp.

Leonardo Jurado
President

SECTION 40 66 11 – PROCESS CONTROL NETWORK SYSTEMS

PART 1 - GENERAL

1.1 SCOPE

- A. This section covers the furnishing of all hardware and software for process control network systems. Principal components of the network systems shall be as indicated on the Drawings and as described below.
- B. System Supplier shall furnish all necessary network equipment, interconnecting cables, accessories, software, and appurtenances for proper network operation and to meet the functional requirements indicated on the Drawings and specified herein. Configuration of all hardware shall be provided by the System Supplier.
- C. Equipment and services provided under the Network Systems section shall be subject to the general requirements specified in the Instrumentation and Control System section. Supplementing this section, network data, special requirements, and options may be indicated on the Drawings.
- D. Control System
 - 1. The Instrumentation and Control System section shall apply to all systems described herein. All applicable requirements specified in the Instrumentation and Control System section shall apply to equipment and services provided herein.
- E. Network Functional Description
 - 1. The process control network system shall provide communications between the operator workstations, servers, network switches, fire walls, routers, and PLCs.

1.2 GENERAL

- A. System Supplier shall select the process control network equipment for its superior quality and the intended performance. The System Supplier shall install all equipment in accordance with the manufacturer's instructions. Equipment and materials used shall be subject to review and shall comply with the following requirements.
- B. General Equipment Stipulations
 - 1. The General Equipment Stipulations shall apply to all equipment and materials provided under this section. If requirements in this specification differ from those in the General Equipment Stipulations, the requirements specified herein shall take precedence.
- C. Drawings

1. Supplementing this section, the Drawings indicate locations and arrangement of hardware and enclosures, provide mounting details, and may show other information regarding the connection and interaction with other equipment.

D. Governing Standards

1. Governing Standards for process control network systems shall be as specified in the Instrumentation and Control System section.

E. Power and Instrument Signals

1. Unless otherwise specified, electric power supply to the network equipment will be unregulated 24 volts dc or 120 volts ac. Where shown, network equipment shall be provided with backup power such as an uninterruptible power supply.

F. Appurtenances

1. Special or manufacturer specific power supplies, special cable, special grounding, and isolation devices shall be furnished for proper performance of the equipment.

G. Interchangeability and Appearance

1. To the extent possible, components used for similar types of functions and services shall be the same brand and model line. Similar components of different network hardware shall be the products of the same manufacturer to facilitate maintenance and stocking of spare parts. Whenever possible, identical units shall be furnished.

H. Programming Software

1. Software required for programming, shall be provided for systems that contain any equipment that requires software for routine maintenance and troubleshooting. The programming software shall be the latest version offered by the manufacturer, compatible with the equipment provided, and newly purchased for this project. Programming software shall be turned over to Owner at completion of startup. Programming software shall be licensed to the Owner.

1.3 SUBMITTALS

- A. Submittals shall be as specified in the Instrumentation and Control System section.

- B. Network Design submittal (to be provided with the First Stage Submittals):

1. A complete process control network topology diagram, detailing all hardware, cabling and the interconnections between all connected equipment. Interconnections to existing installed equipment and Owner-furnished equipment shall be included in the diagram.
2. A complete listing of IP addresses to be assigned to all network and network connected equipment furnished under this contract shall be provided. The assignment of IP addresses shall be coordinated with the Owner. Failure to provide this equipment IP

addresses list with the First Stage Submittals could cause the submittal to be returned as unreviewed or rejected outright.

C. O&M Manuals.

1. All above documentation shall also be provided in the O&M manuals. The Ethernet Network Test reports described herein shall be provided with the Third Stage O&M submittals. Failure to provide the Ethernet Network Test reports with the Third Stage O&M submittals could cause the submittal to be returned as unreviewed or rejected outright.

1.4 DELIVERY, SHIPMENT, PROTECTION, AND STORAGE

- A. Equipment provided under this section shall be shipped, protected, and stored as specified in the Instrumentation and Control System section. Identification of packaging shall be as described in the Instrumentation and Control System section.

1.5 CONNECTION TO EXISTING OWNER NETWORKS

- A. Network hardware and software provided shall be compatible with the Owner's existing process control network systems wherever a system interconnection is provided. System Supplier shall verify existing process control systems to ensure compatibility.
- B. All connections to the Owner's existing network shall be fully coordinated between the Owner and the System Supplier. Prior to connecting to the existing network, the System Supplier shall provide a written request to the Owner for an Owner's representative to be available, along with facility approval as described below when existing systems are disconnected and at the time of any new connections.

1.6 COORDINATION WITH OWNER

- A. The System Supplier shall coordinate all demolitions, installations and rework on the existing networks with the Owner and the Engineer. No work shall be performed without the written consent of the Owner. The System Supplier shall submit a written request to perform work on the existing network, including date, time, scope of work, length of time, and any Owner's support that may be required.

PART 2 - PRODUCTS

2.1 GENERAL

- A. The following paragraphs provide minimum process control Ethernet network device stipulations.

2.2 NETWORK CABLING SPECIFICATIONS

- A. Individual network equipment and related devices shall be coordinated with items provided in the following sections:

1. Fiber Optic Communication Cable and Equipment section

2.3 ETHERNET NETWORK HARDWARE

- A. Ethernet network hardware shall be provided as specified and/or as shown on the Drawings. All specified functionality of provided Ethernet network equipment shall adhere to the IEEE 802.3 and 802.3u standards using copper wire or fiber optic strands. Ethernet network switches shall support ring, bus, tree, or point-to-point network topologies. On-line signal monitoring shall be provided to detect and locate impending faults. Ethernet network switches shall be replaceable on-line without disrupting the network. Redundant Ethernet switches shall be provided where shown on the Drawings. Ethernet switches shall be provided to connect multiple network segments together, selectively forwarding traffic between the segments.

- B. Protocol Gateways

1. Protocol gateways shall be supplied to convert communications to the Owner's standard communication protocol or other protocols as noted on the Drawings. Gateways shall be provided with the following functionality:
 - a. Environmental:
 - 1) Suitable for installation in industrial environments. Operating Temperature Range: -10 to 60°C.
 - b. 24 Vdc power supply input provided with backup power.
 - c. Management: SNMPv3 and Browser-based management shall be supported.
 - d. Convert Modbus RTU (Serial RS-485) communications to EtherNet/IP.
2. Protocol gateways shall be manufactured by Prosoft, Moxa, or equal.

2.4 SPARE PARTS

- A. Spare parts shall be provided as specified below.

<u>Spare Parts</u>	<u>Quantity</u>
Protocol Gateways	1 of each type

PART 3 - EXECUTION

3.1 NETWORK INSTALLATION REQUIREMENTS

- A. Additional network installation requirements are specified in the Instrumentation and Control System section. Networks shall be installed and tested in accordance with the following requirements.

3.2 NETWORK CONFIGURATION

- A. The System Supplier shall fully configure all network devices. All device selections shall be fully coordinated with the Owner to ensure compatibility with existing systems and standards.
- B. Network Configuration Report
 - 1. The System Supplier shall provide a configuration report to the Owner detailing all connections, addresses, and port assignments.

3.3 NETWORK TESTING

- A. After each network has been installed, a technical representative of System Supplier shall test the network and shall provide a written report for each test. Specific testing requirements are described in the individual network specification sections.
- B. Systems Check
 - 1. A technical representative of System Supplier shall participate in the checkout of network systems. Systems check requirements shall be as specified in the Instrumentation and Control System section.
- C. Test Equipment
 - 1. Unless specified otherwise, all test equipment for the calibration and checking of system components shall be provided by System Supplier for the duration of the testing work and this test equipment will remain the property of System Supplier.
 - 2. Ethernet Network Minimum Test Requirements
 - a. The following minimum tests are to be performed by the System Supplier:
 - 1) Verify Link Integrity Status LED is lit on both sides of each link. Refer to product manuals to confirm the LED status indication for each network interface card or network device.
 - 2) Verify proper operation and failover of each redundant component and redundant link. Each redundant server, PLC, or other network hardware device shall be powered down or disconnected from the network to verify that the other device successfully takes control, and all functionality exists. For redundant network connections, each network connection shall be

disconnected to verify that there is no loss of communication on the network.

- 3) Verify alarming of each link failure. Network failure alarms shall be configured within the network interface card software or other network device configuration software. For PLC communication, communication heartbeats shall be configured to detect a loss of communication, and alarms shall be configured when the heartbeat is not received. The generation of a communication alarm shall be confirmed for each network device.
- 4) Verify bandwidth usage of fully installed systems as part of the Operation Acceptance Testing as specified in the Commissioning section. The analysis of the network utilization and bandwidth usage shall be performed using SolarWinds NetFlow Traffic Analyzer or equivalent. Any concerns identified from the analysis shall be clearly identified with the recommended corrective actions.

3. Ethernet Network Test Reports

- a. Upon completion and testing of the installed Ethernet network, the System Supplier shall submit test reports to the Engineer in printed form. Test reports are to show all test results performed by the System Supplier for each port and piece of equipment. Date of calibration of the test equipment is also to be provided.

3.4 NETWORK TROUBLESHOOTING

- A. It is the System Supplier's responsibility to provide trouble-free and reliable networks. The System Supplier shall employ any means necessary to ensure operational networks. The System Supplier shall obtain any needed test equipment, including but not limited to time-domain reflectometers, protocol analyzers and network sniffers, to troubleshoot any problems. The System Supplier shall utilize the services of a trained and certified Network Engineer that is regularly involved in troubleshooting network problems, in the event that operational or reliability problems exist. Acceptable certifications include Cisco CCNP, Cisco CCIE, or Network Professional Association Certified Network Professional (CNP).

End of Section

SECTION 40 66 34 - FIBER OPTIC COMMUNICATION CABLE AND EQUIPMENT

PART 1 - GENERAL

1.1 SCOPE

- A. This section covers the furnishing and installation of fiber optic cable systems to provide communications for the Process Control Network System as indicated on the Drawings.
- B. Accessories and appurtenances shall be provided as specified herein and as required to provide a complete and properly operating system.
- C. Equipment and services provided under this section shall be subject to the requirements specified in the Instrumentation and Control System section and the Process Control Network Systems section. Supplementing the Fiber Optic Communications Cable and Equipment section, network data, special requirements, and options are indicated on the Drawings.
- D. Equipment furnished and installed under this section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with the Drawings, Specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by Engineer.
- E. The Work consists of providing all labor, services, materials, tools, equipment, and appurtenances necessary to furnish, install, test, and commission a complete fiber optic communications network.

1.2 QUALITY ASSURANCE.

- A. General.
 - 1. It is the intent of these Specifications and of the Drawings to establish quality standards of all equipment and materials and to require first class workmanship.
 - 2. All equipment and materials shall be new, free of defects and of the highest quality. No existing or used equipment is allowed.
 - 3. All work shall be accomplished by qualified, experienced personnel working under continuous and competent supervision.
 - 4. The Contractor shall apply and install materials, equipment, and specialties in accordance with manufacturers' written instructions.
 - 5. Fiber optic cable system work shall conform to the construction schedule and the progress of other trades.
- B. Referenced Standards

Fiber Optic Communication Cable and Equipment

1. This Section references the latest revisions of the following standards. They are part of this Section as specified and modified. These shall govern, as applicable, the terminology, design, materials, construction, and the testing methods for the equipment specified in this Section. In case of conflict between the requirements of this Section and those of the listed standards, the requirements of this Section shall prevail.

Reference	Title
ANSI/IEEE Std. 100	IEEE Standard, Dictionary of General and Electronic Terms
Telcordia GR-20-CORE Issue 4	Generic Requirements for Optical Fiber and Optical Fiber Cable
ANSI/ICEA S-104-696-2013	Standard for Indoor-Outdoor Optical Fiber Cable
ANSI/CEA S-83-596	Standard for Optical Fiber Premises Distribution Cable
ANSI/CEA S-87-640	Standard for Optical Fiber Outside Plant Communications Cable
TIA/EIA 455	Standard Test Procedures for Fiber Optic Fibers, Cables, Transducers, Sensors, Connecting and Terminating Devices
ITU-T G.651.1	Characteristics of a 50/125 μm Multimode Graded Index Optical Fibre Cable
TIA/EIA 492AAAA	Detail Specification for 62.5/125 μm Class Ia Graded-Index Multimode Optical Fibers (OM1)
TIA/EIA 492AAAB	Detail Specification for 50/125 μm Class Ia Graded-Index Multimode Optical Fibers (OM2)
TIA/EIA 492AAAC	Detail Specification for 850 nm Laser-Optimized, 50/125 μm Class Ia Graded-Index Multimode Optical Fibers (OM3)
TIA/EIA 492AAAD	Detail Specification for 850 nm Laser-Optimized, 50/125 μm Class Ia Graded-Index Multimode Optical Fibers Suitable for Manufacturing OM4 Cabled Optical Fiber
TIA/EIA 492CAAA	Detail Specification for Class IVa Dispersion-Unshifted Single-Mode Optical Fibers (OS1)
TIA/EIA 492CAAB	Detail Specification for Class IVa Dispersion-Unshifted Single-Mode Optical Fibers with Low Water Peak (OS2)

Fiber Optic Communication Cable and Equipment

Reference	Title
ITU-T G.651.1	Characteristics of a 50/125 μm Multimode Graded Index Optical Fibre Cable
ITU-T G.652.D	Characteristics of a Single-Mode Optical Fibre and Cable
IEC 60793-2-10 Type A1b	Product Specifications - Sectional Specification for Category A1b Multimode Fibres (OM1)
IEC 60793-2-10 Type A1a.1	Product Specifications - Sectional Specification for Category A1a.1 Multimode Fibres (OM2)
IEC 60793-2-10 Type A1a.2	Product Specifications - Sectional Specification for Category A1a.2 Multimode Fibres (OM3 and OM4)
IEC 60793-2-50 Type B1.3	Product Specifications - Sectional Specification for Class B Single-Mode Fibers
TIA/EIA-598-C	Optical Fiber Cable Color Coding
TIA/EIA 526-7	Optical Power Loss Measurements of Installed Single-Mode Fiber Cable Plant, Method A
TIA/EIA 568-C.0	Generic Telecommunications Cabling
TIA/EIA 568-C.3	Optical Fiber Cabling Components Standard
TIA/EIA-604-10A	Fiber Optic Connector Intermateability Standard, FOCIS-10 (Type LC)
TIA/EIA-606-C	Administration Standard for Telecommunications Infrastructure
NECA-301-2016	Standard for Installing and Testing Fiber Optic Cables
RoHS 2011/65/EU	Restriction On the Use of Hazardous Substances
TIA/EIA-606-B	Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
Telcordia GR-TSY-356-CORE	Generic Requirements for Optical Cable Innerduct, Associated Conduit, and Accessories
ANSI/SCTE 77	Specification for Underground Enclosures Integrity
UL 969	Standard for Marking and Labeling Systems

C. Codes and Regulations.

1. This Section references the latest revision of the following codes. They are a part of this Section as specified and modified. Apparent conflicts between the Contract Documents and the listed codes shall be submitted to the Owner for resolution prior to ordering materials or performing affected work.

1.3

Reference	Title
NEC	National Electrical Code (NFPA 70)
NESC	National Electrical Safety Code
UBC	Uniform Building Code

A. Measuring Equipment and Tools.

1. Validity of measurements and tests shall be ensured through the use of suitable inspection, measuring and test equipment of the range and type necessary to determine conformance of items with the Contract requirements. Measuring devices shall be verified or calibrated against certified standards that have a known traceable relationship to the National Bureau of Standards. Every device verified or calibrated shall bear an indication attesting to the current status and showing the date on which inspection or re-calibration is next required. Tests shall not be conducted using test equipment having an expired calibration date. Any tests run with instruments not in compliance with the requirements in this paragraph shall be considered invalid.

1.4 SUBMITTALS

A. Submittals shall be as specified in the Instrumentation and Control System section.

B. Qualifications

1. For projects that involve fiber optic cable installations, the name, address, and telephone number of the proposed contractor or subcontractor who will be installing the fiber optic cables, including specific personnel to perform the work shall be included with the submittals. Provide the experience record of the subcontractor and personnel in performing work similar to that specified. Include the agency, contact person, and telephone number of at least three (3) previous network installation projects completed by the proposed subcontractor. The Engineer shall review and approve the network installation subcontractor and personnel prior to any of the related work being performed. This review will be conducted during the project submittal phase, as described below.

C. Drawings and Data

1. All material and equipment documentation shall be submitted for review in accordance with the Submittals section. Each sheet of descriptive literature submitted shall be clearly marked to identify the material or equipment.

2. Product data shall include the following in the Submittals section:

- a. Cut sheets and catalog literature for proposed fiber optic cable, fiber patch panels, splice enclosures, splicing devices and materials, fiber optic cable accessories (pigtails, connectors, etc.), and other items supplied.
- b. Information shall include materials of construction and complete ordering information.
- c. Product information shall be neatly marked to indicate only those items, options, model, or series of equipment which are being submitted for approval. All extraneous materials shall be crossed out.
- d. Manufacturer specifications and data that clearly show that the process control network system cabling, cable accessories, patch panels, enclosures, and other items supplied meet all requirements specified herein.
- e. Physical dimension drawings of all fiber optic accessories.
- f. Proposed fiber identification sequence and labeling.
- g. Off-line maintenance aids and on-line diagnostics to check the performance of the communication links and interfaces of devices on the data highway.
- h. Recommended Spare Parts List (RSPL).
- i. List of recommended special tools for cable installation testing or maintenance.

D. Fiber Optic Cable Pulling Work Plan

1. Submit for review and acceptance a Fiber Optic Cable Pulling Work Plan.

- a. Contractor shall not perform installation of fiber optic cable and equipment without an approved Fiber Optic Cable Pulling Work Plan by the Engineer.
- b. Submit for review the Fiber Optic Cable Pulling Work Plan a minimum of 30 business days prior to planned initiation of cable pulling.
- c. Provide cabling pulling calculations for the entire run of each fiber optic cable.
- d. The pulling plan and pull tension calculations may be prepared by using a software program such as Pull-Planner 3000 by American Polywater Corporation or approved equal.

2. Submit the following as a minimum.

- a. Pull tension calculations.
- b. Proposed pulling points and direction of pulls.
- c. Pulling lengths and bending radius of conduits.
- d. Detailed description of pull operation methods for all cable runs.
- e. Tools and equipment to be used for cable installation.
- f. Physical location of equipment setup and type.
- g. Safety and manual assist cable pulling operations.
- h. Calculated amount of lubricant required.
- i. Detailed schedule for pulling cables.

E. Test Procedures

1. Submit for review and acceptance Fiber Optic Cable Test Procedures.

Fiber Optic Communication Cable and Equipment

- a. Contractor shall not perform testing of fiber optic cable and equipment without an Engineer approved Test Procedures for all cable and equipment furnished and installed.
 - b. Submit for review a detailed test procedure for each test activity defined in Part 3. No test shall be performed before the test procedure has been accepted by Engineer and Owner. If necessary, Contractor shall reschedule the test, at no additional cost to the Owner, so that this requirement is met.
2. For each test, submit a procedure test form that clearly identifies the following:
 - a. Test Number
 - b. Purpose of test: Describe what is being verified by this particular test.
 - c. Test Method: Describe the setup for the test and the steps required to complete the test. Provide forms and checklist to control and document the required tests.
 - d. Each step in the test procedures shall be numbered and each test shall include a space for Contractor and Owner to initial when the test is satisfactorily completed.
 - e. Criteria: Describe the criteria for passing or failing the test.
 - f. Provide a test schedule.
 - g. Provide a list of all test equipment to be used for the tests.
 - h. Submit test forms to record test results.

F. Test Reports

1. After completion of tests, submit for review and acceptance Fiber Optic Test Reports.
 - a. Develop, maintain, and update a Test Report for each test. This report shall include listings of all test deficiencies and their resolutions, system retesting requirements, and system design changes, if required, due to system testing, and verification for all tests required by this Section.
 - b. Submit the Test Report within five (5) business days after the completion of each required test. The Owner reserves the right to delay or suspend follow-on project activities if an acceptance test report has not been provided in the required time period.
 - c. Provide test results in printed and electronic format (native format for the application and in PDF format). Cover sheet shall include date of test and original signatures of test witnesses. Provide five (5) printed copies of all test reports.

G. Fiber Optic Cable System Records

1. Provide cable records and fiber assignments of the “as-built” condition of each cable, fiber, and each fiber patch panel. Documentation shall be provided in hard copy and on USB drive. Provide five (5) printed copies of fiber optic cable system records. At a minimum, the following shall be provided:
 - a. Fiber optic cable routing and location information.
 - b. Fiber connectivity information.
 - c. Patch panel locations.
 - d. Patch panel fiber termination data.
 - e. Cable lengths.
 - f. Cable part numbers.

H. Operations and Maintenance Manuals

1. Operation and Maintenance Manuals shall have the following items included in addition to those items specified in other sections:
 - a. Description of all components.
 - b. Product Data Submittal.
 - c. Cable routing diagrams.
 - d. Connection diagrams.
 - e. Test Reports.
 - f. Fiber Optic Cable Lengths Records.
 - g. Fiber Optic Patch Panel Fiber Assignment Tables.
 - h. Fiber Optic Jumper Cable Patch Records.
 - i. Maintenance and troubleshooting procedures.

1.5 SHIPMENT, PROTECTION, AND STORAGE

- A. Equipment provided under this section shall be shipped, protected, and stored in accordance with the requirements of the Instrumentation and Control System section.

1.6 QUALIFICATIONS

- A. Due to the specialized nature of installing, splicing, terminating, and testing optical fiber cable, the Contractor shall utilize personnel who are experienced in such practices. The installing Contractor or Subcontractor shall have performed similar installation and testing work on at least three projects of similar size and complexity. The personnel assigned to the installation and testing shall also have experience on at least three projects of similar size and complexity.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All fiber optic cable, fiber optic hardware and accessories shall be designed, assembled and connected in accordance with the requirements of these Specifications and the Drawings.
- B. Materials shall be new, free from defects, and of the quality specified. Parts shall be replaceable with standard commercial components of the same description without degrading the performance of the completed assembly.
- C. All fiber optic cables and equipment of each type shall be from the same manufacturer.

2.2 FIBER OPTIC CABLE

- A. The fiber optic cable must meet all of the following common requirements:
 1. Every fiber in the cable shall be usable and meet requirements of this Section.

Fiber Optic Communication Cable and Equipment

2. All optical fibers shall be sufficiently free of surface imperfections and inclusions to meet the optical, mechanical, and environmental requirements of this Section.
3. All optical fibers shall be proof tested by the fiber manufacturer at a minimum load of 100 kpsi.
4. The storage temperature range for the cable on the original shipping reel shall be -40°C to $+70^{\circ}\text{C}$. The operating temperature range shall be -40°C to $+70^{\circ}\text{C}$. Testing shall be in accordance with FOTP-3.
5. The attenuation specification shall be a maximum attenuation for each fiber at $23 \pm 5^{\circ}\text{C}$.
6. Each fiber shall be distinguishable from others by means of color coding in accordance with TIA/EIA-598-C, "Optical Fiber Cable Color Coding."
7. The fibers shall be colored with ultraviolet (UV) curable inks.
8. The jacket shall be continuous, free from pinholes, splits, blisters, or other imperfections. The jacket shall have a consistent, uniform thickness; jackets extruded under high pressure are not acceptable. The jacket shall be smooth, as consistent with the best commercial practice. The jacket shall provide the cable with a tough, flexible, protective coating, able to withstand the stresses expected in normal installation and service.
9. The outer cable jacket shall be marked with the manufacturer's name or UL file number, date of manufacture, fiber type, flame rating, UL symbol, and sequential length markings every two feet (e.g. "62.5/125 MICRON – TYPE OFNR – (UL) 00001 Feet").
10. The cable shall be gel-free.
11. The cable manufacturer shall be TL 9000 Quality Management System certified.
12. Refer to the Drawings for number of fibers per cable.

B. NEC Requirements

1. All fiber optic cable shall meet the following requirements:
 - a. Fiber optic cable shall meet the requirements of the National Electrical Code (NEC) Section 770.
 - b. The cable jacket for all non-plenum cables shall be rated for indoor/outdoor use and shall meet the flame resistance rating requirements for NEC listed Type OFNR cable. Cables shall be constructed with polymer coated yarn that swells upon exposure to water thereby preventing intrusion of moisture into the cable.
 - c. The cable jacket for plenum cables shall meet the flame resistance rating requirements for NEC listed Type OFNP cable.
 - d. Riser Applications – Applicable Flame Test UL 1666.

C. OM1 Multimode Fiber

1. Multimode fiber shall meet the following general requirements:

- a. Environment: Indoor/Outdoor Cable
 - b. Cable Type: Loose Tube with Ripcords
 - c. Approved Cable Manufacturers: Belden, CommScope, Corning Cable Systems, AFL, Superior Essex, or approved equal.
2. Optical Specifications.
 - a. Multimode optical fiber cable shall meet TIA/EIA 492-AAAA and Telcordia Generic Requirements GR-20-CORE and the following optical requirements:
 - 1) Fiber type: Multimode (OM1)
 - 2) Maximum Attenuation: 3.25 dB/km @ 850 nm / 1.0 dB/km @ 1300 nm
 - 3) Cladding Diameter (μm): 125.0 ± 2.0
 - 4) Core Diameter (μm): 62.5 ± 3.0
 - 5) Core-to-Cladding Concentricity (μm): ≤ 3.0
 - 6) Cladding Non-Circularity (%): ≤ 2.0
 - 7) Point Discontinuity (dB): ≤ 0.2 @ 850 nm / ≤ 0.2 @ 1300 nm
3. Cable Design.
 - a. Central Element: Dielectric
 - b. Fiber Coloring: Blue, Orange, Green, Brown, Slate, White, Red, Black, Yellow, Violet, Rose, Aqua
 - c. Outer Jacket Material: Flame Retardant, UV-Resistant
 - d. Armor: None.
 - e. Jacket(s): Dual
 - f. Outer Jacket Color: Black
 - g. Max. Tensile Strength, Short-Term: 2670 N (600 lbf)
 - h. Max. Tensile Strength, Long-Term: 800 N (180 lbf)
 - i. Min. Bending Radius (Installation): 15X Cable OD (Non-Armored)
 - j. Min. Bending Radius (Operation): 10X Cable OD
4. Cable Construction:
 - a. The central member shall consist of all dielectric material. The purpose of the central member is to provide tensile strength and prevent buckling.
 - b. The inner layer of the cable shall contain a water-swellable yarn or water-blocking element for water-blocking protection. The water-swellable yarn or water-blocking element shall be non-nutritive to fungus, electrically non-conductive, and homogeneous. It shall also be free from dirt or foreign matter. The yarn or element will preclude the need for other water-blocking material; the cable shall be gel-free.
 - c. Polyethylene jacketing material shall be applied directly over the interlocking armor. The polyethylene shall contain carbon black to provide ultraviolet light protection and shall not promote the growth of fungus.
 - d. The cable jackets shall be free of holes, splits, and blisters.
 - e. The cable jackets shall contain no metal elements and shall be of a consistent thickness.
 - f. Cable jackets shall be marked with the manufacturer's name, month and year of manufacture, sequential foot markings, a telecommunication handset symbol as required by Section 350G of the National Electrical Safety Code, fiber count, and

fiber type. The actual length of the cable shall be within 1% of the length markings. The print color shall be white. The height of the marking shall be approximately 2.5 mm.

D. Fiber optic cable connectors

1. All optical fibers shall have connectors installed by one of the following two methods (mechanical or epoxy connectors are no longer allowed).
 - a. Preconnectorized Pigtail Cables.
 - 1) Preconnectorized pigtail cables may be fusion spliced to the fibers from the fan-out kits.
 - 2) Connector style, ST, SC, LC, or other, shall be coordinated with the patch panels and field devices that will interface directly with the cable.
 - 3) Preconnectorized pigtail cables shall be compatible with the supplied cable.
 - 4) Connector loss shall be no greater than 0.3 dB. Loss measurement shall be performed at the time of splicing and documentation shall be furnished for each termination.
 - 5) Preconnectorized pigtail cables shall be Corning Cable Systems or equal.
 - b. Fusion Splice-On Connectors.
 - 1) Fusion splice-on connectors may be fusion spliced to the fibers from the fan-out kits.
 - 2) Connectors shall be installed using the appropriate tool kit manufactured by the same supplier as the connectors and in accordance with manufacturer's instructions.
 - 3) Connector style, ST, SC, LC, or other, shall be coordinated with the patch panels and field devices that will interface directly with the cable.
 - 4) Connector loss shall be no greater than 0.3 dB. Loss measurement shall be performed at the time of splicing and documentation shall be furnished for each termination.

E. Fiber Optic Jumper Cables

- a. Fiber optic jumper cables with factory-terminated and tested connectors shall be furnished and installed for equipment interfacing and between termination cabinets. The jumpers shall meet the following requirements:
 - 1) The jumpers shall be multimode OM1 for operation at 1300 nm. They shall be tight-buffered and be protected by Kevlar-type strength material.
 - 2) The jumpers shall be supplied with connectors on each end. Connector types (ST, SC, LC, etc.) shall be matched to the equipment provided. Jumpers shall be sized to provide a single connection between the fiber optic hardware being connected.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The System Supplier shall be responsible for the coordination of the installation of all cable furnished hereunder. The System Supplier shall be responsible for the termination of all cable furnished hereunder.
- B. Cable Damage
 - 1. If the cable becomes damaged during installation, the Contractor shall stop work and notify the Engineer immediately. The Owner and Engineer will decide whether to replace the entire reel of cable or to install a splice at the damaged section. If the Owner decides to replace the entire reel of cable, the Contractor shall begin the installation at the last designated splice point. The damaged cable between these points shall be removed, coiled, tagged, and given to the Owner. Installation of new cable to replace damaged cable shall not be a basis of extra payment or contract completion time. In addition to installation of the new cable, the Contractor shall reimburse the Owner for the entire cost of the replacement reel of cable. This cost will be withheld from the contract price. If the Owner decides to install a splice at the damaged point, and the cable is damaged a second time, the entire reel of damaged cable (and all subsequent damaged reels) shall be replaced with new reels at the Contractor's expense.
- C. Fiber Optic Cable.
 - 1. All fiber optic cable shall be installed, terminated, and tested by a qualified and approved fiber optic cable subcontractor. Coordinate the location of new fiber optic cables and equipment with the Owner based upon existing conditions at the project site including, but not limited to, actual routing of conduit duct banks, clearances, and locations of equipment. Minor changes in location of the material or equipment installed under this Contract from the locations shown on Contract Drawings shall be made at no cost to the Owner.
 - a. Fiber Optic Cable Packaging, Handling, and Delivery
 - 1) Each cable shall be packaged for shipment on non-returnable wooden reels.
 - a) Top and bottom ends of the cable shall be available for testing prior to removing cable from the reel.
 - b) Both ends of the cable shall be sealed to prevent the ingress of moisture.
 - c) Each cable reel shall be provided with all information necessary to positively trace the cable origin.
 - 2) Each cable reel shall have a weather resistant reel tag attached identifying the reel and cable and include the following information as a minimum:
 - a) Cable number.
 - b) Shipped cable length in feet.
 - c) Manufacturer's product number.
 - d) Gross weight.
 - e) Job order number.
 - f) Customer order number.
 - g) Date cable was tested in factory.

- 3) One flange of each cable reel shall be marked with the following as a minimum:
 - a) Cable manufacturer's name.
 - b) Country of origin
 - c) An arrow indicating proper direction of roll when handling.
 - d) Forklift handling illustration.
 - e) "DO NOT SHIP REEL ON SIDE" or "DO NOT LAY REEL ON ITS SIDE".
 - 4) Each cable shall be accompanied by a cable data sheet including the following information as a minimum:
 - a) Cable number.
 - b) Factory order number.
 - c) Manufacturer's product number.
 - d) Customer cable number.
 - e) Customer purchase order number.
 - f) Ordered cable length in feet.
 - g) Actual shipped cable length in feet.
 - h) Measured attenuation of each fiber.
 - i) Date cable was tested in factory.
 - 5) Care shall be taken to prevent damage to cable, equipment and material during delivery and storage.
 - 6) Upon receipt of each equipment item, the cable and equipment shall be visibly inspected for physical damage. No damaged equipment shall be installed. All costs to replace and reinstall damaged equipment shall be borne by the Contractor.
 - 7) Upon receipt of the fiber optic cable, the cable shall be visibly inspected for physical damage. The Contractor shall perform the Fiber Optic Cable Reel Test specified herein as soon as is practicable after cable delivery and prior to installation. Fiber optic cables not passing the Reel Test shall not be installed and shall be removed from the project site at no cost to the Owner.
 - 8) Any damaged cable, equipment and material shall be removed from the project site and replaced at no additional cost to the Owner.
 - 9) All cable handling and storage shall be performed in strict accordance with the manufacturer's recommendations.
 - 10) During the installation, and up to the date of final acceptance, the Contractor shall be under obligation to protect their finished and unfinished work against damage and loss. In the event of such damage or loss, they shall replace or repair such work at no cost to the Owner.
- b. Fiber Optic Cable Installation
- 1) The installation of fiber optic cable and associated appurtenances shall be performed in strict accordance with the manufacturer's recommendations.
 - 2) Contractor shall exclusively use fiber optic cable installers who have a minimum of three (3) years' experience installing and splicing fiber optic cables.
 - 3) Prior to the installation of any cable or equipment, the Contractor shall review the conduit systems and equipment panels that will house the cable and equipment provided and installed under this Contract. The Contractor shall notify the Owner and Engineer in writing if any conflicts are identified in this regard prior to the purchase of any equipment.

- 4) Contractor shall plan the work and inform Owner and Engineer on a daily basis of the fiber optic cable installation work schedule.
- 5) Install fiber optic cable conduit per the requirements of the Electrical sections and the following requirements:
 - a) The minimum bending radius for 2-inch fiber optic cable conduits shall be 24 inches. The minimum bending radius for 4-inch fiber optic cable conduits shall be 36 inches.
 - b) The maximum number of degrees of conduit bends between fiber optic cable pulling points shall be 180 degrees. Furnish and install additional indoor pull boxes and outdoor handholes to meet this requirement.
 - c) Furnish and install duct plugs where fiber optic cable conduits from buildings enter each hand hole. Furnish and install duct plugs where fiber optic cable conduit terminates in buildings. Duct plugs shall prevent the ingress of moisture and rodents.
 - d) Seal all conduit and cabinet entrances with RTV or other re-enterable sealant material to prevent ingress of water, dust or other foreign materials.
 - e) The maximum distance between pull boxes shall be 100ft. If conduit with fiber optic cable will run more than 100ft without pull box or handhole, a pull box shall be installed.
 - f) A prelubricated polyester tape with minimum strength of 600lbs shall be installed as pull string for future use in fiber optic conduits. Pull string shall be Neptco Muletape, with no exceptions.
- 6) Install fiber optic cables in accordance with NECA 301-2009, per the requirements of the Electrical sections.
- 7) During installation, care shall be taken not to bend the cable excessively. The bending radius shall not be less than 15 times the outside diameter of the cable or twelve (12) inches, whichever is greater. Minimum bend radius restrictions shall be satisfied both during and after cable installation.
- 8) The Fiber Optic Cable Pulling Work Plan shall be submitted and successfully reviewed in accordance with the submittal requirements in Part 1 prior to starting installation of fiber optic cable.
- 9) Do not exceed cable manufacturer's maximum tensile rating during cable installation by means of strain-release or other tension limiting devices.
- 10) No residual tension shall remain on cable after installation except that which is due to cable's weight in vertical rise.
- 11) Except for hand pulls, pulling tension shall be continuously monitored during cable installation.
- 12) Fiber cable shall be pulled in a steady continuous manner.
- 13) For vertical runs of fiber optic cable, the following requirements shall be followed:
 - a) Secure vertical cable at top of run.
 - b) Attachment point shall comply with cable's minimum bend radius.
 - c) Provide intermediate support when manufacturer specified maximum cable rise has been reached.
 - d) Support cable by Kellems, or equal, woven mesh grips.
- 14) Manufacturer approved clamps and supports shall be used to relieve stress on the fiber optic cable. Horizontal, unsupported cable runs shall be supported at continuous distances of 5 feet or less. The installation of

- fittings and clamps shall be performed using tools and procedures conforming to the manufacturer's recommendations.
- 15) Fiber optic cable shall be provided in continuous runs without mid-span splices.
 - 16) A 25-foot (minimum) coil of additional unstripped cable in each fiber optic cable shall be provided in the vicinity of each cable termination point. Provide slack loops in pull boxes.
 - 17) Fiber optic cable shall be protected at all times to prevent cutting or puncturing the jacket, contamination by oil or grease, or any other damage. Cable shall not be pulled tight against bushings nor pressed heavily against enclosures.
 - 18) Cable routing within buildings and occupied office areas shall conform to Federal, State, and local electrical and fire codes.
 - 19) Labels shall meet the legibility, defacement, exposure and adhesion requirements of UL 969.
 - 20) Splice and terminate fiber optic cables in accordance with the following requirements:
 - a) Fiber optic cables shall be spliced and terminated in Fiber Patch Panel (FPP) at the terminal location of each cable as shown on the Drawings.
 - b) Mid-span splices are not allowed.
 - c) All fiber strands shall be spliced and terminated at both ends.
 - d) Splices shall be performed only by experienced personnel with proper equipment. The work area shall be arranged such that the area is kept clean, and the exposed cable is protected from physical damage.
 - e) Splice a factory connectorized fiber optic pigtail cable to each fiber in all fiber optic cables entering fiber patch panels.
 - f) All splices shall be fusion type splices.
 - g) Provide a minimum of 12 inches of spare fiber for each splice.
 - h) Splices shall not cause attenuation of signal exceeding allowable attenuation budget.
 - i) Measure the optical power loss as the splices are being made. Splices with an optical loss of greater than 0.2 dB shall be redone.
 - j) After splicing, the splice point shall be protected by the splice tray and placed into the terminating hardware. Splices shall be protected using heat shrink tubing and mechanical crimp protectors.
 - k) Fiber patch panel terminations shall be provided in pre-assembled housings that snap into the fiber patch panels.
 - l) Fiber patch panel connector modules shall be sized for a minimum of 12 fiber terminations.
 - m) After splicing, the connectorization point shall be protected and placed into terminating hardware.
 - n) Labeling shall conform to the requirements specified within ANSI/TIA/EIA-606-B or to the requirements specified by the Owner.
 - 21) Install fiber patch panels as shown on the Drawings and as part of the Work specified in the Panels, Consoles, and Appurtenances section.
 - 22) Furnish and install fiber optic patch (jumper) cables as shown on the Drawings. Cap unused patch panel ports.
 - 23) Ground the armor on armored fiber optic cables in accordance with manufacturer's recommendations.

3.2 CABLE TESTING

- A. After the network cabling has been installed, each network cable shall be tested.
- B. Test Equipment
 - 1. Unless specified otherwise, all test equipment for the calibration and checking of system components shall be provided by System Supplier for the duration of the testing work and this test equipment will remain the property of System Supplier.
- C. Fiber Optic Cable Testing
 - 1. Prior to acceptance of the system by the Owner, the completed fiber optic cabling system including all splices, terminations, and connections shall be tested to demonstrate that all cables and devices furnished, installed, and/or connected under the provisions of these Specifications function in the manner required. The existing fiber optic cable terminated in the new marshalling cabinets shall also be tested to demonstrate compliance with this section.
 - a. The Contractor shall not proceed with a test unless the corresponding test procedures have been submitted and received a favorable submittal review.
 - b. Provide all labor, materials, tools, field-test instruments and equipment required for the complete testing, identification, and administration of the work called for in the Contract Documents.
 - c. Test fiber optic cables in accordance with NECA 301-2009.
 - d. Fiber testing shall be performed on all fibers in each cable.
 - e. If any test requirement is not met, the Contractor shall take immediate steps to identify the cause of the condition. When the cause is identified, notify the Owner and Engineer in writing of its nature and provide a description of the proposed method or procedure to rectify the problem.
 - f. Field testing shall be witnessed by the Owner and Engineer.
 - g. Owner and Engineer shall be notified of the start date of each test a minimum of five (5) business days before testing commences.
 - h. Owner may conduct a parallel random sample test of 5% of the installed links at Owner's expense. The results obtained will be compared to the data provided by the Contractor. If more than 2% of the parallel test results differ in terms of the pass/fail determination, Contractor shall repeat 100% testing at no cost to the Owner.
- D. Test Preparation
 - 1. In preparation of each test, conduct the following work:
 - a. Provide test jumpers of the same core size and connector type as the cable system.
 - b. Stabilize optical sources at 1310 nm and at 1550 nm for single-mode fiber and 850 nm and 1300 nm for multimode fiber.
 - c. Calibrate the power meter at each of the nominal test wavelengths.
 - d. Properly clean connectors, adapters, and jumpers prior to measurement.
- E. Test Equipment and Materials

Fiber Optic Communication Cable and Equipment

1. The following materials shall be submitted and approved prior to the start of cable testing:
 - a. A list of test equipment which will be used during the course of the cable testing.
 - b. The manufacturer's specification sheets for each item of test equipment.
 - c. The proposed testing sequence, expected duration and scheduled date proposed for testing.
 - d. Blank copies of the test forms proposed including pass/fail criteria.
 - e. A list of personnel who will conduct the fiber testing, and a summary of their qualifications.

F. Test Personnel

1. Testing shall be conducted only by technicians who have successfully attended an appropriate training program including, at a minimum, training with an optical time domain reflectometer and optical loss test sets and have obtained a certificate as proof thereof. Furnish proof of the certification of all test personnel. These certificates may have been issued by any of the following organizations or an equivalent organization.
 - a. Training organizations including BICSI, a Telecommunications Association, Association of Cabling Professionals (ACP), or approved equivalent.
 - b. Manufacturer of the test equipment used for the field testing of the fiber optic cable system.
 - c. Manufacturer of the fiber optic cable.

G. Fiber Optic Cable Reel Test

1. The Fiber Optic Cable Reel Test (Reel Test) is a preliminary test performed after cable has been delivered to the project site and prior to installation. This test shall be performed as soon as practicable after receipt of the shipment. The Reel Test only requires one end of the cable and does not require connectors on the fiber. The Reel Test shall verify that the fiber is received from the shipper in sound condition and without manufacturing defects. Any anomalies shall be reported immediately to the shipper and manufacturer. Cable shall not be installed until it passes this test.
 - a. Reel Test Requirements. Record the following information:
 - 1) Cable ID.
 - 2) Cable type.
 - 3) Number of fibers.
 - 4) Cable length as shown on reel.
 - 5) Maximum specified loss at 850 nm and 1300 nm for multimode fiber.
 - 6) Maximum specified loss at 1310 nm and 1550 nm for single-mode fiber.
 - 7) Date.
 - 8) Test crew names.
 - 9) OTDR model and serial number.
 - b. Inspect the cable and record any visible signs of defects and damage. Damaged cables shall not be installed.
 - c. Strip at least two feet of the cable end. Clean and strip the fibers.
 - d. Use a bare fiber adapter and an OTDR to take the following measurements from one end of the cable.

- 1) Total loss at 850 nm for multimode fiber or 1310 nm for single-mode fiber.
 - 2) Attenuation per 1000 feet at 850 nm or 1310 nm, per cable type.
 - 3) Total loss at 1300 nm for multimode fiber or 1550 nm for single-mode fiber.
 - 4) Attenuation per 1000 feet at 1300 nm or 1550 nm, per cable type.
 - 5) Total length as indicated by ODTR.
 - 6) Note any anomalies (rescale for clarity and record).
 - 7) Date.
 - 8) Test crew names.
 - 9) OTDR model and serial number.
- e. Print and record the OTDR traces on disk. Indicate direction of measurement, and fiber color.
- f. Note differences between the 850 (1310) nm trace and the 1300 (1550) nm trace.
- 1) Uncut cable shall have no reflections or attenuation steps.
 - 2) Attenuation steps or gains at both wavelengths indicate spliced, broken, or damaged fiber.
 - 3) Reflections indicate broken fiber.
 - 4) Compare the test results to the manufacturer's specifications.
 - 5) Remove bare fiber adapter and cut off excess fiber from the cable end.
 - 6) Note any anomalies (rescale for clarity and record).
 - 7) Install heat shrink or other protective covering to the cable end to prevent the entry of moisture or other contaminants.
 - 8) Test crew names.
 - 9) OTDR model and serial number.
- g. Attenuation for any fiber exceeding 5% of data provided in the shipping records shall be cause for rejection of the entire reel.
- h. Failure of a single fiber in a cable shall be cause for rejection of the entire reel.
- i. Reels of cable that fail to meet the requirements of the Reel Test shall be replaced at no cost to the Owner.

H. Magnified Endface Inspection and Record

1. Inspect and record the endface of each fiber strand prior to terminating or splicing the fiber.
 - a. The endface of each fiber shall be inspected for endface quality at a magnification of 400X.
 - b. Scratched, pitted, or dirty connectors shall be corrected.
 - c. Endface images shall be recorded in the memory of the test instrument for subsequent uploading to a computer and reporting in PDF file format.

I. Splice Loss Test

1. Test and document the splice loss for each fiber strand for each pigtail assembly during cable termination at patch panels. Submit the documentation for this testing as part of this test procedure. Measurements shall be made at both 850 nm and 1300 nm wavelengths for multimode fiber, and 1310 nm and 1550 nm wavelengths for single-mode fiber. No splice shall have a loss of 0.2 dB or greater.

2. Splice Loss Test Report

- a. Submit completed test sheets as part of the test report on the splice loss measurement. The sheets shall include the following.
 - 1) Project identification and facility location.
 - 2) Test date.
 - 3) Make, model and serial number of the test equipment.
 - 4) Cable identifiers.
 - 5) Fiber identifiers and color.
 - 6) Terminal test location.
 - 7) Wavelength.
 - 8) Splice Loss.
 - 9) The signatures of the splicer and all witnesses.

J. Fiber Continuity and Length Determinations

1. Measure the fiber optic continuity and length of each fiber with an optical power meter or OTDR after fibers have been terminated. Measurements shall be made at 850 nm and 1300 nm wavelengths for multimode fiber, and 1310 nm and 1550 nm wavelengths for single-mode fiber in both directions along each fiber.
2. Fiber Continuity and Length Determinations Report
 - a. Submit fiber continuity and length test documentation for each fiber as tested in both directions. The documentation shall include the following.
 - 1) Project identification and facility location.
 - 2) Test date.
 - 3) Make, model and serial number of the test equipment.
 - 4) Cable ID.
 - 5) Fiber ID and color.
 - 6) Terminal test location.
 - 7) Test wavelengths.
 - 8) Length and verification of continuity for each fiber strand.
 - 9) Acceptability of all cables (i.e. pass/fail)
 - 10) The signatures of test personnel and all witnesses.

K. OTDR Test

1. The end-to-end optical quality of each fiber shall be tested per TIA/EIA 455 after all fibers in each cable are spliced and terminated at the patch panels. OTDR traces shall be created and submitted for each fiber.
2. A launch cable shall be installed between the OTDR and the first link connection. Testing of the cabling shall be performed using high quality test cords of the same fiber type as the cabling being tested.
3. Measurements shall be made at both 850 nm and 1300 nm wavelengths for multimode fiber, and 1310 nm and 1550 nm wavelengths for single-mode fiber in both directions along each fiber. To be accepted, each fiber shall show on the OTDR trace as a continuous span free from transmission anomalies, uniformity of cable attenuation and connector insertion loss. OTDR traces shall show no signs of abnormal characteristics when compared to the traces performed by the manufacturer prior to shipment.

4. OTDR Test Criteria

- a. Each cabling link shall meet or exceed the following OTDR test requirements.
 - 1) Reflective events (connections) shall not exceed 0.75 dB.
 - 2) Non-Reflective events (splices) shall not exceed 0.30 dB.

5. OTDR Test Report

- a. Submit fiber quality test documentation for each fiber strand as tested in both directions. The documentation shall include the following.
 - 1) Project identification and facility location.
 - 2) Test date.
 - 3) Make, model and serial number of the test equipment.
 - 4) Cable ID and type.
 - 5) Fiber ID and color.
 - 6) Test terminal locations.
 - 7) Wavelength.
 - 8) Optical return loss (ORL in dB) at 850 nm and 1300 nm wavelengths for multimode fiber, and 1310 nm and 1550 nm wavelengths for single-mode fiber.
 - 9) OTDR traces and acceptability of all fiber strands (i.e. pass/fail) at 850 nm and 1300 nm wavelengths for multimode fiber, and 1310 nm and 1550 nm wavelengths for single-mode fiber.
 - 10) The signatures of test personnel and all witnesses.

L. Optical Loss Test

- 1. Testing shall consist of an end-to-end optical power meter test performed in accordance with TIA/EIA 526-7. Provide optical power loss measurements at 850 nm and 1300 nm wavelengths for multimode fiber, and 1310 nm and 1550 nm wavelengths for single-mode fiber. Measure the optical power loss for each fiber. Use a stabilized light source and an optical power meter for the test. Establish and measure the reference power receive level using a patch cord and connectors of the same types used on the full cable. Care shall be taken to provide an exact match of connectors and mating hardware used in the reference measurement so that the same setup losses are reproduced when measuring the full cable. Do not turn off the LED or laser source at any time during the testing. Properly clean all connectors.

2. Optical Loss Test Criteria

- a. The measured optical power loss for each end-to-end fiber link shall be less than or equal to the maximum allowable loss calculated using the equation below. The terminal locations of end-to-end links are the ports in the fiber patch panels.

$$PL = Ns(Ls) + 2(Lc) + (La)(Length) + 0.5$$

Where PL = Optical power loss, maximum allowable
Ns = Number of slices in end-to-end link
Ls = Loss per splice (0.2 dB)
Lc = Loss per connector (0.3 dB)
La = MM optical power attenuation at 850 nm (3.0 dB/km)

La = MM optical power attenuation at 1300 nm (1.0 dB/km)
La = SM optical power attenuation at 1310 nm (0.65 dB/km)
La = SM optical power attenuation at 1550 nm (0.50 dB/km)
Length = Fiber length (km)

3. Optical Loss Test Report

- a. Submit fiber test documentation for each fiber strand. The documentation shall include the following.
 - 1) Project identification and facility location.
 - 2) Test date.
 - 3) Make, model and serial number of the test equipment.
 - 4) Cable ID and type.
 - 5) Fiber ID and color.
 - 6) Test terminal locations.
 - 7) Wavelength.
 - 8) Span length.
 - 9) Maximum allowable optical power loss for each end-to-end link at 850 nm and 1300 nm wavelengths for multimode fiber, and 1310 nm and 1550 nm wavelengths for single-mode fiber.
 - 10) Measured optical power loss for each end-to-end link (per strand) at 850 nm and 1300 nm wavelengths for multimode fiber, and 1310 nm and 1550 nm wavelengths for single-mode fiber.
 - 11) Acceptability of all fiber strands (i.e. pass/fail).
 - 12) The signatures of test personnel and all witnesses.

4. Fiber Optic Patch Cable Test

- a. Each fiber optic patch cable shall be tested and must exhibit an end-to-end attenuation of less than 2.0 dB at 850 nm for multimode fiber and 1310 nm for single-mode fiber. Any jumper exceeding this attenuation shall be replaced at no additional cost to the Owner. Submit test documentation for fiber optic patch cord test results.

M. Compliance

1. Any fiber optic cable not meeting the testing requirements of this Section shall be brought into compliance by the Contractor at no additional cost to the Owner.
2. Failed Test Correction Requirements
 - a. Any link that fails the test requirements shall be diagnosed and corrected. Any corrective action that must take place shall be documented and followed with a new test to prove that the corrected link or channel meets performance requirements. The final and passing result of the tests for all links and channels shall be provided in the test results documentation as specified herein.
3. Failed Test Replacement Requirement

Fiber Optic Communication Cable and Equipment

- a. Any fiber optic cable containing one or more fibers not meeting the testing requirements will not be accepted by the Owner and shall be replaced and retested at no additional cost to the Owner.

4. Broken Strand Correction Requirement

- a. If one (1) or more pairs of strands for a fiber optic cable is found to be broken the entire cable shall be removed, and a new cable shall be installed at no additional cost to Owner.

3.3 INSPECTION

- A. After the completion of installation and testing, a walkthrough shall be performed to verify the Contract requirements are complete. The inspection will be conducted by the Owner and/or Engineer in the presence of the Contractor. The inspection shall be performed at a time agreeable to all parties.

B. Final Inspection Checklist

1. The final inspection checklist shall include, but not be limited to the following.
 - a. Fiber cable terminations shall be neatly dressed and organized in fiber patch panels.
 - b. Fiber splices at terminal panels shall be neatly organized in splice trays.
 - c. All connectors and unused patch panel ports shall be capped and undamaged.
 - d. All cables shall be properly identified. Install directories in each fiber termination and patch panel.
 - e. Fiber optic cables in handholes shall be neatly dressed.
 - f. Fiber optic conduits shall be sealed as specified.
 - g. All cabling shall be installed with no excessive bending.
 - h. Verify unused cable has been delivered to the Owner.

C. Punchlist

1. Discrepancies found during the inspection of the fiber installation shall be listed and provided to the Contractor in the form of a punchlist. Correct all punchlist items at no increase in Contract time or Contract cost. Inform the Owner and/or Engineer upon completion of the punchlist items.

3.4 COMPLETION OF WORK

- A. At the completion of the Work, remove all waste and excess materials, rubbish debris, tools and equipment resulting from or used in the services provided under this Contract.

Fiber Optic Communication Cable and Equipment

3.5 WARRANTY

- A. The fiber optic cable system, including all cable, splices, connectors, fiber termination panels and other connecting hardware, shall be warranted to be free from defects in material or faulty workmanship for a period of three (3) years from acceptance of the system by the Owner.

End of Section

SECTION 40 67 11 - PANELS, CONSOLES, AND APPURTENANCES

PART 1 - GENERAL

1.1 SCOPE

- A. This section covers the furnishing of panels, consoles, and appurtenances as indicated on the Drawings and listed in the attached Equipment Schedules 40 67 11-S01.
- B. This section also describes requirements for panels furnished under other sections whose respective specification refers to this section. Panels furnished under other sections are not listed in the attached Equipment Schedules.
- C. This section also covers the furnishing of all panel mounted instruments and accessories required for the Instrumentation and Control System as specified herein or as indicated on the Drawings.
- D. When multiple instruments of a particular type are specified, and each requires different features, the required features are described on the Drawings.
- E. Control System
 - 1. The Instrumentation and Control System section shall apply to all equipment furnished under the Panels, Consoles and Appurtenances section. Supplementing the Instrumentation and Control System section, instrument data, special requirements, and options are indicated on the Drawings.

1.2 GENERAL

- A. Equipment furnished and installed under this section shall be fabricated and assembled in full conformity with the Drawings, specifications, equipment schedules, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by Engineer.
- B. Panel mounted instruments shall be installed to measure, monitor, or display the specified process at the ranges and service conditions indicated on the Drawings. The instruments shall be installed at the locations indicated on the Drawings.
- C. Where possible, each instrument shall be factory calibrated to the calibration ranges indicated on the Drawings. Transmitters or similar measurement instruments shall be calibrated using National Institute of Standards and Technology (NIST) approved bench calibration procedures, when such procedures exist for the instrument type. For "smart" devices, calibration data shall be stored digitally in each device, including the instrument tag designation indicated on the Drawings.
- D. General Equipment Stipulations

Panels Consoles and Appurtenances

1. The General Equipment Stipulations shall apply to all equipment and materials provided under this section. If requirements in this specification differ from those in the General Equipment Stipulations, the requirements specified herein shall take precedence.

E. Seismic Design Requirements

1. Seismic design requirements for products specified herein shall be as indicated in the Meteorological and Seismic Design Criteria section.

F. Drawings

1. General dimensions and arrangements are indicated on the Drawings and on the attached equipment schedules. System Supplier shall be responsible for coordinating the console and enclosure sizes and arrangements to accommodate the equipment provided.

1.3 SUBMITTALS

- A. Submittals shall be as specified in the Instrumentation and Control System section.

B. Meteorological and Seismic Compliance

1. Submit confirmation of compliance with the requirements of the Meteorological and Seismic Design Criteria section.

1.4 DELIVERY, STORAGE, AND SHIPPING

- A. Delivery, storage and shipping shall be as per the Instrumentation and Control System section.

1.5 SPARE PARTS

- A. Spare parts shall be provided as specified below.

<u>Spare parts</u>	<u>Quantity</u>
Fuses	1 box of each type/size
Control relays	4 of each type

PART 2 - PRODUCTS.

2.1 PANEL DESIGN AND FABRICATION FEATURES

- A. All panels furnished shall conform to the stipulations of NEMA ICS-6-1993 (R2001, R2006, R2011, R2016). Unless indicated otherwise on the Drawings, the following paragraphs describe general fabrication specifications for the PLC cabinets, instrument panels, consoles, enclosures, and subpanels.

Panels Consoles and Appurtenances

B. Power Entrance

1. The power entrance to each panel shall be provided with a surge protection device. Refer to the Instrumentation and Controls section for surge suppression requirements.

C. Power Wiring

1. Power distribution wiring on the line side of panel fuses shall be minimum 12 AWG. Secondary power distribution wiring shall be minimum 14 AWG. Wiring for ac power distribution, dc power distribution, intrinsically safe, and control circuits shall have different colors and shall agree with the color-coding legend on System Supplier's panel wiring diagrams. With the exception of electronic circuits, all interconnecting wiring and wiring to terminals for external connection shall be stranded copper, insulated for not less than 600 volts, with a moisture resistant and flame retardant covering rated for not less than 90°C.

D. Instrument and Control Wiring

1. All internal panel wiring shall be type MTW stranded copper wiring rated not less than 600 volts. Electronic analog circuits shall be twisted and shielded pairs rated not less than 300 volts. Analog circuits shall be separated from ac power circuits. Intrinsically safe circuits shall be physically separated from other circuits in accordance with applicable codes. Wires within the panel shall conform to the minimum size as shown in the table below.

<u>Type</u>	<u>Minimum Wire Size</u>	<u>Color</u>
AC Control	16 AWG	Red
DC Control	16 AWG	Blue
Analog Circuits	18 AWG Twisted Pair	Black / White or Black / Red

2. All wiring shall be grouped or cabled and firmly supported inside the panel. Each individual wire in power, control, and instrumentation circuits shall be provided with identification markers at each point of termination. The wire markers shall be positioned to be readily visible for inspection and the identification numbers shall match the identification on the supplier's panel wiring drawings. Wiring shall be bundled in groups and bound with nylon cable ties or routed in Panduit or similar nonmetallic slotted ducts. Ducts shall be readily accessible within the panel, with removable covers, and with space equal to at least 40 percent of the depth of the duct remaining available for future use after completion of installation and field wiring. Sufficient space shall be provided between cable groups or ducts and terminal blocks for easy installation or removal of cables.

E. Terminal Blocks

1. Terminal blocks for external connections shall be suitable for 12 AWG wire and shall be rated 30 amperes at not less than 300 volts. Terminal blocks shall be fabricated complete with marking strip, covers, and pressure connectors. Terminals shall be labeled to agree with identification shown on the supplier's submittal drawings. A terminal shall be provided for each conductor of external circuits, plus one ground for each shielded cable.

Panels Consoles and Appurtenances

Not less than 8 inches of clearance shall be provided between the terminal strips and the base of vertical panels for conduit and wiring space. Not less than 25 percent spare terminals shall be provided. Each control loop or system shall be individually fused, and all fuses or circuit breakers shall be clearly labeled and located for easy maintenance.

F. Device Tag Numbering System

1. All devices shall be provided with permanent identification tags. The tag numbers shall agree with the supplier's equipment drawings. All field-mounted transmitters and devices shall have stamped stainless steel identification tags. Panel, subpanel, and rack-mounted devices shall have laminated phenolic identification tags securely fastened to the device. Hand-lettered labels or tape labels will not be permitted.

G. Nameplates

1. Nameplates shall be provided on the face of the panel or on the individual device. Panel nameplates shall have legends and approximate dimensions as indicated on the Drawings and shall be made of laminated phenolic material having engraved letters approximately 3/16 inch high extending through the black face into the white layer. Nameplates shall be secured firmly to the panel. Panel face nameplates do not replace the requirement for device identification tags as specified under the Device Tag Numbering System paragraph.

H. Indicating Light Color Designations

1. Indicating lights shall be colored as shown in the following table unless indicated otherwise on the Drawings or in other specification sections,.

<u>Color</u>	<u>Meaning</u>
Green	Associated equipment or device is "running," "open," or is in an "unsafe" state or position
Red	Associated equipment or device is "stopped," "closed," or is in a "safe" state or position
Amber	Associated equipment or device has "failed" or a process alarm condition is present or imminent.
White	All other conditions not defined above.

I. Painting

1. Interior and exterior surfaces of all carbon-steel panels shall be thoroughly cleaned and painted with rust inhibitive (universal) primer. The panel interior shall be painted white with the manufacturer's standard coating. All pits and blemishes in the exterior surface shall be filled. Exterior surfaces shall be painted with one or more finish coats of the manufacturer's standard coating. Finish coats shall have a dry film thickness of at least 4 mils. One quart of touch-up paint shall be furnished with the panels.

J. Factory Test

1. Panels shall be factory tested by the panel fabricator before shipment.

2.2 FREESTANDING VERTICAL PANELS

A. The following paragraphs specify the freestanding vertical panels:

1. Construction

- a. Panel construction shall be an indoor, dusttight, completely enclosed cubicle formed from steel structural members and steel plates. The base shall be formed of steel channels, with flanges extending upwards. The base shall be provided with 1/2 inch diameter holes at 12 inch centers so that the base can be bolted to the concrete equipment base. Welds, seams, and edges on all exposed surfaces shall be ground smooth. Suitable lifting facilities shall be provided for handling and shipment.

2. Structure

- a. Panel structure shall be suitably braced and of sufficient strength to support all equipment mounted on or within, to withstand handling and shipment, to remain in proper alignment, and to be rigid and freestanding. Top, sides, and back shall be fabricated from USS 10 gage or heavier carbon steel sheets, with stationary back suitable for back to wall installation, or designed for rear access with hinged back doors. Doors shall not be greater than 18 inches wide. No single door panel shall require more than 18 inches of clearance to fully open. Rear access doors shall be fabricated from USS 14 gage or heavier carbon steel.

3. Panel Front

- a. The front of the new PLC control panels shall consist of two hinged doors, with mounted instruments and control devices, fabricated from USS 10 gage carbon steel sheet and suitably braced and supported to maintain alignment. The front of the new marshalling cabinets shall consist of a single hinged door. Panels with hinged fronts shall be of sufficient width to permit door opening without interference with rear projection of flush mounted instruments.

4. Doors

- a. Doors shall be essentially full height, having turned back edges and additional bracing to ensure rigidity and prevent sagging. Doors shall be mounted with strong, continuous, piano type hinges. Positive latches, acting from a common door handle, shall hold doors securely compressed at top, side, and bottom against rubber gaskets.

5. Mounted Instruments

- a. The front shall be stationary, with mounted instruments and control devices, fabricated from 3/16 inch carbon steel plate. Panel fronts shall be suitably reinforced between mounting cutouts and drilling to support instruments and devices without deformation and shall be free from waves and other imperfections, Panel fronts shall be recessed at the base. Adjoining panel sections shall be accurately shop fitted to assure satisfactory assembly in the field.
- b. Instrument Arrangement
 - 1) Panel instruments and control devices shall be arranged in a logical configuration for the plant operators. Control switches shall be within 6 feet

and 2'-6" above the base of the panel. Indicators may be located within 2'-6" and 6'-6" above the base of the panels. Annunciators and clocks may be mounted near the top of the panels.

6. Conduit Entrance

- a. For the new PLC control panels, the top shall be provided with nominal 1 square foot removable access plates, which may be drilled to accommodate external wiring and conduit to be installed from above. For the new marshalling cabinets, the bottom shall be open, and components shall be arranged for external wiring conduit and piping to enter from below. The existing conduit stub-ups shall enter the new marshalling cabinets.

7. Size and Arrangement

- a. Panel dimensions and general instrument arrangement shall be as indicated in the attached equipment schedules.

8. Interior Lighting

- a. Illumination of panel interiors shall be provided by ceiling mounted lamp fixtures spaced at approximately 2'-6" and near the door. Fixtures shall be minimum 400 lumen LED type, with a common "On-Off" switch near each end door. Duplex-grounded receptacles shall be provided for service and maintenance tools at spacing not greater than 5 feet throughout the length of a panel. The lighting and receptacle circuit shall be fused separately from the instrumentation systems.

2.3 FIBER OPTIC PATCH PANELS

- A. Fiber optic patch panels (also referred to as fiber termination cabinets) shall be furnished to terminate fibers at the fiber optic modules, and any other data highway attached equipment. The cabinets shall meet the following requirements:
 1. The patch panels shall have provisions for terminating multiple fiber optic cables. Splice trays, strain relief cable attachment points, fiber organizers and bend radius hardware shall be furnished with each termination cabinet.
 2. Panel size shall be suited to the number of fibers to be terminated within the cabinet. Bayonet/flanged couplings shall be furnished and mounted for each fiber to be terminated.
 3. Fiber terminations shall be spliced to pigtail cables having ST connectors. The pigtails shall be terminated in an orderly method.
- B. Fiber optic patch panels shall be OFS Technologies "LGX," Corning Cable Systems "WCH Series," or equal.

2.4 PANEL MOUNTED INSTRUMENTS AND APPURTENANCES

- A. The following paragraphs describe minimum device stipulations. The Drawings shall be used to determine any additional instrument options, requirements, or service conditions. Installation of these panel mounted instruments and appurtenances shall be installed in a similar manner to the existing PLC enclosures.

1. Panel Mounted Devices.

a. Alarm Horns.

- 1) Horns shall be high-decibel, panel-mount, vibrating type designed for heavy-duty use. Horn volume shall be field-adjustable from 78 to 103 dB at 10 feet. Horns shall operate at 120 volts ac. Horns shall be weatherproof NEMA Type 4X. Horns shall be panel front mounted and shall be supplied with gasket. Horns shall be Edwards Signals "870P Series."

b. Switches, Lights, and Push Buttons.

1) Selector Switches.

- a) Selector switches shall be 30.5-mm, heavy-duty, oil-tight type with gloved-hand or wing lever operators. Position legends shall be engraved on the switch faceplate. Switches for electric circuits shall have silver butting or sliding contacts, rated 10 amperes continuous at 120 V ac. Contact configuration shall be as indicated on the Drawings or for the application. Switches used in electronic signal circuits shall have contacts suitable for that duty. Switches shall be manufactured Schneider Electric, Eaton/Cutler-Hammer, General Electric, or Allen Bradley, or equal.

2) Indicating Lights.

- a) Indicating lights shall be 30.5-mm, heavy-duty, oil-tight type, with full voltage LED lamps. Legends shall be engraved on the lens or on a legend faceplate. Lights shall be push-to-test type. Indicating lights shall be manufactured Schneider Electric, Eaton/Cutler-Hammer, General Electric, or Allen Bradley, or equal.

3) Push Buttons.

- a) Push buttons shall be 30.5-mm, heavy-duty, oil-tight type. Legends shall be engraved on the push-button faceplate. Contacts shall be rated 10 amperes continuous at 120 V ac. Push buttons shall be manufactured Schneider Electric, Eaton/Cutler-Hammer, General Electric, or Allen Bradley, or equal.

2. Panel Interior Mounted Appurtenances.

a. Intrinsically Safe Barriers.

- 1) Barriers shall be solid-state electronic type in which the energy level of the sensing or actuation circuit is low enough to allow safe use in hazardous areas. Barriers shall be located in non-hazardous areas. Barriers shall be manufactured by MTL, R. Stahl, Inc., Phoenix Contact, or Turck.

b. Power Supplies.

- 1) Regulated dc power supplies for instrument loops shall be designed and arranged so that loss of one supply does not affect more than one instrument

loop or system. Power supplies shall be suitable for an input voltage variation of ± 10 percent, and the supply output shall be fused or shortcircuit protected. Output voltage regulation shall be by the instrumentation equipment supplied. Multiloop or multisystem power supplies will be acceptable if backup power supply units are provided which will automatically supply the load upon failure of the primary supply. The backup supply systems shall be designed so either the primary or the backup supply can be removed, repaired, and returned to service without disrupting the instrument system operation. Multiloop power supply connections shall be individually fused so a fault in one instrument loop will be isolated from the other loops being fed from the same supply. Fuses shall be clearly labeled and shall be located for easy access. Multiloop supply systems shall be oversized for an additional 10 percent future load. Failure of a multiloop supply shall be indicated on the respective instrument panel or enclosure.

2) Power supplies shall be Allen Bradley, Phoenix Contact, PULS, or equal.

c. Relays.

1) Relays indicated to be provided in panels, enclosures, or systems furnished under this section shall be of the plug-in socket base type with dustproof plastic enclosures unless noted otherwise. Relays shall be UL recognized and shall have not less than double-pole, double-throw contacts. Control circuit relays shall have silver cadmium oxide contacts rated 10 amperes at 120 V ac. Electronic switching-duty relays shall have gold-plated or gold alloy contacts suitable for use with low-level signals. Relays used for computer input, alarm input, or indicating light service shall have contacts rated at least 3 amperes. Time delay relays shall have dials or switch settings engraved in seconds and shall have timing repeatability of ± 2 percent of setting. Latching and special purpose relays shall be for the specific application. Unless otherwise indicated, all relays shall have an integral pilot light that illuminates to indicate an energized condition. Relays shall be IDEC "Series RR"; Potter & Brumfield "Series KRP, CB"; or Struthers-Dunn "Series 219, 246".

d. Signal Booster/Isolators.

1) Signal boosters and isolators shall have all solid-state circuitry and complete electrical isolation between the power supply and the input and output signals. Accuracy shall be ± 0.15 percent of span. Signal boosters and isolators shall be manufactured by Acromag, Moore Industries-International, Inc., or Phoenix Contact.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. Installation requirements are specified in the Instrumentation and Control System section. In addition, equipment furnished under this section shall conform to the following manufacturing stipulations.

1. Wiring

Panels Consoles and Appurtenances

- a. All wiring shall be grouped or cabled and firmly supported inside the panel. Wiring shall be bundled in groups and routed in Panduit or similar nonmetallic slotted ducts. Ducts shall be readily accessible within the panel with removable covers and shall have a space of at least 40 percent of the depth of the duct available for future use after installation is complete and all field wiring installed. Sufficient space shall be provided between cable groups or ducts and terminal blocks for easy installation or removal of cables.
2. More Than One Panel
 - a. Where signal or loop wiring must be routed to more than one panel or device, the required circuit routing shall be as indicated on the one-line diagrams. The panel fabricator shall provide such additional circuits as may be indicated on the electrical schematic Drawings.

3.2 PANEL MOUNTED INSTRUMENT FIELD SERVICES.

- A. Manufacturer's field services shall be provided for installation, field calibration, startup, and training as specified in the Instrumentation and Control System section. Instruments shall not be shipped to the Work Site until two weeks prior to the scheduled installation. System Supplier shall be responsible for coordinating the installation schedule with the Installation Contractor. Each shipment shall contain a listing of protective measures required to maintain sensor operation, including a listing of any common construction or cleaning chemicals that may affect instrument operation.

End of Section

Panels Consoles and Appurtenances

Equipment Schedule 40 67 11-S01

FREESTANDING VERTICAL PANELS

1.000	General						
1.010	Specification Section 40 67 11						
2.000	Freestanding Vertical Panels						
2.010	Tag Number/Panel ID	PLC-81	PLC-82	PLC-83	Cell A Marshalling Cabinet	Cell B Marshalling Cabinet	Cell C Marshalling Cabinet
2.020	NEMA Enclosure Rating						
	12	X	X	X			
	4						
	4X				X	X	X
2.030	Materials of construction						
	Carbon steel	X	X	X			
	316 Stainless steel				X	X	X
	Fiberglass polyester						
2.040	Environmental provisions						
	Sunshade and drip shield						
	Cooling fan						
	Air conditioner						
2.050	Door Arrangements						
	Hinged rear doors						
	Two hinged front doors with instruments	X	X	X			
	Hinged front door without instruments				X	X	X
	Fixed front						
	Recessed base						
2.060	Dimensions (maximum H x W x D)	72" x 36" x 24"	72" x 36" x 24"	72" x 36" x 24"	72" x 32" x 24"	72" x 32" x 24"	72" x 30" x 24"
2.070	Panel interior-mounted UPS	X	X	X			
2.080	Conduit entrance						
	Bottom open				X	X	X
	Removable top plates	X	X	X			
3.000	Exceptions, Clarifications, and Comments						
3.010	None	Each front door must be no greater than 18" wide.			Note that the width specified for the marshalling cabinets are exact such that the existing conduit entries can be reused. Upon installation of the new marshalling cabinet and associated terminal blocks, the I&C System Supplier shall coordinate with the Contractor to preserve all existing conduit stub-ups and associated field cables terminating at the existing PLC enclosure (excluding cables routed across the existing channel conduit rack).		