PROJECT MANUAL

FOR
PLEASANT PARK
1.5 MG ELEVATED WATER TANK
TOWN OF APEX
WAKE COUNTY, NORTH CAROLINA

TWC JOB NO. 2519-CK
SFRF PROJECT NO. OSBM-APEX-66

SEPTEMBER 2024

Wooten

120 N. Boylan Avenue
Raleigh, nc 27603
919.828.0531
License Number: F-0115

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CERTIFICATIONS PAGE

Civil Specifications

I, Miles Galloway, P.E., hereby certify that 00 21 13 Instruction to Bidders, 00 41 00 Bid Form, 00 73 00 Supplementary Conditions, Division 01, Division 03, Division 08, Division 09, Division 31, Division 32, Division 33, and Division 40 of the, Pleasant Park 1.5 MG Elevated Water Tank Project Manual were prepared by me or under my direct supervision.

13-SEPT-2024

B. Electrical Specifications

I, Henry Bourne, P.E., hereby certify that Division 26 of the, Pleasant Park 1.5 MG Elevated Water Tank Project Manual were prepared by me or under my direct supervision.

9-13-2024

END OF SECTION

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SECTION 00 01 10

TABLE OF CONTENTS

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ADVERTISEMENT FOR BIDS

TOWN OF APEX
APEX, NORTH CAROLINA
PLEASANT PLAINS 1.5 MG ELEVATED WATER TANK

Legal Notice

Pursuant to NC General Statutes 143-129, sealed bids will be received by the Town of Apex for the furnishing of all materials and construction of the **Pleasant Plains 1.5 MG Elevated Water Tank**.

Sealed Bids for the construction of the **Pleasant Plains 1.5 MG Elevated Water Tank** will be received by The Town of Apex, at the **Town of Apex Water Resources Department Building, 105-B Upchurch Street, Apex, North Carolina, 27502** until **11:00 AM** local time on **October 22, 2024** at which time the Bids received will be publicly opened and read. The Project consists of constructing **1.5 MG Elevated Water Tank (Composite Style) and 190 LF of 20" water main.**

Hand delivered bids sealed bids are preferred to attn: Jacob Perry, EI at 105-B Upchurch Street, Apex, NC 27502. Mailed bids should be submitted to the Town of Apex, 105-B Upchurch Street, Apex, North Carolina 27502, attn: Jacob Perry. EI. All bids should be sealed and marked "***Pleasant Plains 1.5 MG Elevated Water Tank – October 22, 2024 – 11:00 am***." All bids must be accompanied by a 5% bid bond and shall be subject to the conditions provided in the Instructions to Bidders. Bidders shall submit with their Bids affidavits of "Good Faith Efforts" in the recruitment of Minority Businesses.

Bids will be received for a single prime Contract. Bids shall be on a lump sum basis.

The Issuing Office for the Bidding Documents is: **The Wooten Company, 120 N. Boylan Avenue, Raleigh, NC 27603.** Prospective Bidders may obtain copies of the Bidding Documents from the Issuing Office as described below.

Bidding Documents also may be examined at the Issuing Office on Monday through Friday between the hours of 9 am and 4 pm; online at **Dodge Construction, Construct Connect, and North American Procurement Council, Inc**; and the office of the **Town of Apex Water Resources Department**, on Mondays through Fridays between the hours of 8 a.m. to 4 p.m. Prospective Bidders may obtain Bidding Documents upon the submittal of the non-refundable fee, as listed below, to the attention of Ms. Jen Acevedo (jacevedo@thewootencompany.com) at the Issuing Office

Bidding Documents may be obtained from the Issuing Office during the hours indicated above. Bidding Documents are available on with access to website download of PDF: Registration and access to the Issuing Office Project Bidding site for electronic download of Bidding Documents as PDF files for a fee in the amount of $50.00. This does not include printed copies. Access to Website and Printed Copies: Bidding Documents, including full size Drawings, will be shipped to the Bidder for a fee in the amount of $400.00. The Bidding Documents will be shipped UPS ground. This fee will include registration and access to the Issuing Office Project Bidding site for electronic download of Bidding Documents as PDF Files. The date that the Bidding Documents are transmitted by the Issuing Office will be considered the prospective Bidder's date of receipt of the Bidding Documents. Partial sets of Bidding Documents will not be available from the Issuing Office. Neither Owner nor Engineer will be responsible for full or partial sets of Bidding Documents, including Addenda if any, obtained from sources other than the Issuing Office.

A pre-bid conference will be held at **10:00 am** local time on **October 3, 2024** at the **Town of Apex Water Resources Department, 105-B Upchurch St., Apex, NC 27502**. Attendance at the pre-bid conference is highly encouraged but is not mandatory.

Owner: **Town of Apex**

By: **Jacob Perry, EI**

Title: **Utility Engineer**

Date: **September 20, 2024**

Bidders shall submit documentation of their efforts as well as affidavits of their good faith efforts in the recruitment of small, minority, and women owned businesses.

+ + END OF ADVERTISEMENT FOR BIDS + +

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INSTRUCTIONS TO BIDDERS

TABLE OF CONTENTS

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.

ARTICLE 2 – COPIES OF BIDDING DOCUMENTS

2.01 Complete sets of the Bidding Documents may be obtained from the Issuing Office in the number and format stated in the advertisement or invitation to bid.

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

2.03 Owner and Engineer, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Work and do not authorize or confer a license for any other use.

ARTICLE 3 – MINORITY PARTICIPATION GOALS

3.01 Bidders must make positive efforts to utilize minority businesses. Bidders shall have a goal of ten percent (10%) for participation of minority business enterprises in construction contracts awarded pursuant to NCGS 143-128.2.

3.02 Bidder shall be required to submit identification of firms and Affidavits as required in the Bid Form.

ARTICLE 4 – QUALIFICATIONS OF BIDDERS

4.01 To demonstrate Bidder's qualifications to perform the Work, after submitting its Bid and within 5 days of Owner's request, Bidder shall submit written evidence which shall include, but not be limited to, the following:

A. Official name of Bidder and length of time the organization has been in business under present name.

B. 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.

C. Officers of the company. Name and resume of designated project manager and field superintendent. Number of regular employees of the organization.

D. Latest financial statement showing assets and liabilities of the company.

E. Name and home office address of the Surety proposed and the name and address of the responsible local claim agent.

F. Listing of completed projects of similar size and type. Provide name and phone number of project owner representative.

G. Existing work commitments.

H. List of work to be subcontracted. Name and addresses of subcontractors.

I. Names and addresses of major material Suppliers.

J. Statement that bidder is capable of completing the project within the stated time.

K. The apparent Low Bidder shall submit within 72 hours of the Bid Date the following Affidavits:

1. Affidavit C, Portion of the Work to be Performed by Minority Firms.

2. Affidavit D, Good Faith Efforts

4.02 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.

4.03 No requirement in this Article 4 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.

4.04 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

Bidders are notified that compliance with Chapter 87 of the General Statutes of North Carolina is a prerequisite to being awarded the contract. Bidders for this Project must have a General Contractors license with one of the following classifications with a limitation appropriate to the bid amount:

A. Classifications:

1. Unclassified

2. Public Utilities Contractor

3. Public Utilities (Water Lines and Sewer Lines)

B. Limitations:

1. "Limited": Up to $500,000

2. "Intermediate": Up to $1,000,000

3. "Unlimited": No limit on contract value"

ARTICLE 5 – SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

5.01 *Site and Other Areas*

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

5.02 *Existing Site Conditions*

A. Subsurface and Physical Conditions; Hazardous Environmental Conditions

1. The Supplementary Conditions identify:

a. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site.

b. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

c. reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.

d. Technical Data contained in such reports and drawings.

2. Owner will make copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.

B. Underground Facilities: Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or adjacent to the Site are set forth in the Contract Documents and are based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.

C. Adequacy of Data: Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraphs 5.03, 5.04, and 5.05 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work, appear in Paragraph 5.06 of the General Conditions.

5.03 *Site Visit and Testing by Bidders*

A. Bidder shall conduct the required Site visit during normal working hours, and shall not disturb any ongoing operations at the Site.

B. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.

C. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site.

D. Bidder shall comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.

E. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

5.04 *Owner's Safety Program*

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

5.05 *Other Work at the Site*

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

ARTICLE 6 – BIDDER'S REPRESENTATIONS

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

A. examine and carefully study the Bidding Documents, and any data and reference items identified in the Bidding Documents and any Addenda;

B. visit the Site, conduct a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfy itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;

C. become familiar with and satisfy itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work;

D. carefully study all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings;

E. consider the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs;

F. agree, based on the information and observations referred to in the preceding paragraph, that at the time of submitting its Bid no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;

G. become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;

H. Obtain and carefully study (or assume responsibility for not doing so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents, and safety precautions and programs incident thereto;

I. Correlate the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents;

J. 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;

K. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work; and

L. agree that the submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 7 – PRE-BID CONFERENCE

7.01 A pre-Bid conference will be held at the time and location stated in the invitation or advertisement to bid. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are encouraged 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 8 – INTERPRETATIONS AND ADDENDA

8.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing. Questions will not be taken by phone. Questions may be emailed to the Engineer's email address as follows: mgalloway@thewootencompany.com. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all parties recorded as having received the Bidding Documents. Questions received less than seven 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.

8.02 Addenda may be issued to clarify, correct, supplement, or change the Bidding Documents.

ARTICLE 9 – BID SECURITY

9.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of five percent (5%) of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and

in the form of a certified check, bank money order, or a Bid bond (on the form included in the Bidding Documents) issued by a surety meeting the requirements of Paragraphs 6.01 and 6.02 of the General Conditions.

9.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract Documents, furnished the required contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 10 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.

9.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Contract or the end of the Bid holding period, whereupon Bid security furnished by such Bidders will be released.

9.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within seven days after the Bid opening.

ARTICLE 10 – CONTRACT TIMES

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

ARTICLE 11 – LIQUIDATED DAMAGES

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

ARTICLE 12 – SUBSTITUTE AND "OR-EQUAL" ITEMS

12.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration during the bidding and Contract award process of possible substitute or "or-equal" items. In cases in which the Contract allows the Contractor to request that Engineer authorize the use of a substitute or "or-equal" item of material or equipment, application for such acceptance may not be made to and will not be considered by Engineer until after the Effective Date of the Contract.

12.02 All prices that Bidder sets forth in its Bid shall be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of "or-equal" or substitution requests are made at Bidder's sole risk.

ARTICLE 13 – SUBCONTRACTORS, SUPPLIERS, AND OTHERS

13.01 A Bidder shall be prepared to retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of the Work if required by the Bidding Documents (most commonly in the Specifications) to do so. If a prospective Bidder objects to retaining any such Subcontractor, Supplier, or other individual or entity, and the concern is not relieved by an Addendum, then the prospective Bidder should refrain from submitting a Bid.

13.02 Subsequent to the submittal of the Bid, Owner may not require the Successful Bidder or Contractor to retain any Subcontractor, Supplier, or other individual or entity against which Contractor has reasonable objection.

13.03 The apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to Owner a list of the Subcontractors or Suppliers proposed for any portions of the Work.

If requested by Owner, such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, or other individual or entity. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder shall submit a substitute, Bidder's Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.

13.04 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, or other individuals or entities. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.06 of the General Conditions.

ARTICLE 14 – PREPARATION OF BID

14.01 The Bid Form is included with the Bidding Documents.

A. Bids must be made on the required Bid Form. All blanks on the Bid Form shall be completed in ink and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.

B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words "No Bid" or "Not Applicable."

14.02 A Bid by a corporation shall be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation shall be shown.

14.03 A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The partnership's address for receiving notices shall be shown.

14.04 A Bid by a limited liability company shall be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the firm's address for receiving notices shall be shown.

14.05 A Bid by an individual shall show the Bidder's name and address for receiving notices.

14.06 A Bid by a joint venture shall be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture's address for receiving notices shall be shown.

14.07 All names shall be printed in ink below the signatures.

14.08 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.

14.09 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.

14.10 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder's state contractor license number, if any, shall also be shown on the Bid Form.

14.11 Bidder shall complete the form, Identification of Minority Business Participation, identifying the minority businesses that will be utilized on the project with corresponding total dollar value and Affidavit A, Listing of Good Faith Efforts, or Affidavit B, Intent to Perform Contract with own Workforce, as required by G.S. 143-128.2(c) and G.S. 143-128.2(f). Failure to comply with these requirements is grounds for rejection of the bid.

ARTICLE 15 – BASIS OF BID

15.01 *Lump Sum*

A. Bidders shall submit a Bid on a lump sum basis as set forth in the Bid Form.

15.01 Base Bid with Alternates

A. 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 and 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.

B. In the comparison of Bids, alternates will be applied in the same order of priority as listed in the Bid Form.

15.02 *Unit Price*

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

B. The "Bid Price" (sometimes referred to as the extended price) for each unit price Bid item will be the product of the "Estimated Quantity" (which Owner or its representative has set forth in the Bid Form) for the item and the corresponding "Bid Unit Price" offered by the Bidder. The total of all unit price Bid items will be the sum of these "Bid Prices"; such total will be used by Owner for Bid comparison purposes. The final quantities and Contract Price will be determined in accordance with Paragraph 13.03 of the General Conditions.

C. Discrepancies between the multiplication of units of Work and 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.

15.03 *Allowances*

A. For 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 16 – SUBMITTAL OF BID

16.01 Bid form is to be completed and submitted with all the attachments outlined in Article 7 of the Bid Form. The complete list of required bid documents can also be found in the attached Bidder's Checklist. The checklist shall be the first page of all bids submitted.

16.02 A Bid shall be received no later than the date and time prescribed and at the place indicated in the advertisement or invitation to bid and shall be enclosed in a plainly marked package with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED." A mailed Bid shall be addressed to:

Town of Apex
Attention: Jacob Perry, EI
105-B Upchurch Street
Apex, NC 27502-0250

16.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

16.04 When using the mail or other delivery system, the Bidder is fully responsible for the mail or other delivery system delivering the Bid at the place and prior to the time indicated in the Advertisement for Bid.

ARTICLE 17 – MODIFICATION AND WITHDRAWAL OF BID

17.01 A Bid may be withdrawn prior to opening by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.

17.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in the paragraph above and submit a new Bid prior to the date and time for the opening of Bids.

17.03 After the bid opening, a Bid may only be withdrawn in accordance with N.C.G.S. 143-129.1.

ARTICLE 18 – OPENING OF BIDS

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

ARTICLE 19 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

19.01 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 20 – EVALUATION OF BIDS AND AWARD OF CONTRACT

20.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible. If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, then the Owner will reject the Bid as nonresponsive; provided that Owner also reserves the right to waive all minor informalities not involving price, time, or changes in the Work.

20.02 If Owner awards the contract for the Work, such award shall be to the responsible Bidder submitting the lowest responsive Bid.

20.03 Evaluation of Bids

A. In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.

B. For the determination of the apparent low Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price Bid for that item, together with any lump sum items.

C. 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 Bids in which that Bidder has an interest.

D. In determining the lowest responsible Bidder, Owner shall take into consideration the past performance of Bidder on construction contracts with particular concern given to completion times, quality of work, cooperation with other contractors, and cooperation with owner.

E. Owner reserves the right to reject Bid 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.

F. 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.

20.04 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.

20.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.

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

20.07 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.

20.08 If the Contract is to be awarded, Owner will award the Contract to the responsible Bidder who's Bid, conforming with all the material terms and conditions of the Instruction to Bidders, is lowest, price and other factors considered. If detailed in the bid form, factors such as discounts, transportation costs, and life cycle costs may be used to determine which bidder, if any, is to be offered the award.

ARTICLE 21 – SIGNING OF AGREEMENT

21.01 When Owner issues a Notice of Award to the Successful Bidder, it shall be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement. Within 10 days thereafter, Successful Bidder shall execute and deliver the required number of counterparts of the Agreement (and any bonds and insurance documentation required to be delivered by the Contract Documents) to Owner. Within ten days thereafter, Owner shall deliver one fully executed counterpart of the Agreement to Successful Bidder, together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions.

ARTICLE 22 – SALES AND USE TAXES

22.01 Owner is not exempt from state sales and use taxes on materials and equipment to be incorporated in the Work. Said taxes shall be included in the Bid.

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SECTION 00 31 32.10

GEOTECHNICAL REPORT

GEOTECHNICAL REPORT WILL BE ISSUED AS PART OF A BID ADDENDUM OR BID MODIFICATION

END OF SECTION

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BID FORM

Project: ___Pleasant Park 1.5 MG Elevated Water Tank_____

Bid From: _____

TABLE OF CONTENTS

ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

TOWN OF APEX
105-B UPCHURCH STREET
APEX, NC 27502-0250

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

ARTICLE 3 – BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

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

Addendum No.	Addendum, Date

B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and has satisfied itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

E. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and any Site-related

reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.

F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.

H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Bidder.

I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.

J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

K. Bidder will submit written evidence of its authority to do business in the state where the Project is located not later than the date of its execution of the Agreement.

ARTICLE 4 – BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;

B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;

C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and

D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process;

2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and

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

Lump Sum Bid Price	$

Bidder to include in other Bid item(s) the other costs (if any) associated with accepting such assignment and administering the assigned contract.

Total Bid Price $ _____

Time of Completion

5.02 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

5.03 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 6 – ATTACHMENTS TO THIS BID

6.01 The following documents are submitted with and made a condition of this Bid. Failure to provide the documentation with the bid may be grounds for rejection of the bid.:

A. Required Bid security in the form of a Bid Bond (EJCDC No. C-430) or Certified Check (circle type of security provided).

B. In accordance with GS 143-128.2(c), Bidder shall identify on its bid the minority businesses that it will use on the project and the total dollar value of the bid that will be performed by the minority businesses and list the good faith efforts (Affidavit A) made to solicit participation. A Bidder that will perform all of the work with its own workforce may submit an Affidavit (B) to that effect in lieu of the affidavit (A) required above.

1. Identification of Minority Business Participation.

2. Affidavit A, Listing of Good Faith Efforts; or Affidavit B, Intent to Perform Contract with Own Workforce.

C. 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.

D. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such license within the time for acceptance of Bids;

E. Contractor's License No.: _____ **[or]** Evidence of Bidder's ability to obtain a State Contractor's License and a covenant by Bidder to obtain said license within the time for acceptance of Bids;

F. Required Bidder Qualification Statement with supporting data; and

6.02 After the bid opening the Owner will consider all bids and alternates and determine the lowest responsible, responsive bidder. Upon notification of being the apparent low Bidder, the Bidder shall then file within 72 hours of the notification of being the apparent lowest bidder, the following:

A. An Affidavit (C) that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, which is equal to or more than the goal established by the Owner and indicated in the Instruction to Bidders, paragraph Minority Participation Goals. This affidavit shall give rise to the presumption that the bidder has made the required good faith effort; or

B. Affidavit (D) of its good faith effort to meet the goal. The document must include evidence of all good faith efforts that were implemented, including any advertisements, solicitations and other specific actions demonstrating recruitment and selection of minority businesses for participation in the contract.

6.03 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 7 – DEFINED TERMS

7.01 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 8 – BID SUBMITTAL

Contractor's License

A. Number:_____

B. Classification:_____

C. Limitation:_____

Employer's Tax ID No.: _____

BIDDER: *[Indicate correct name of bidding entity]*

_____

Telephone Number: _____

Fax Number: _____

Contact Name and e-mail address: _____

_____

_____

This Bid Submitted by:

An Individual

Name: _____

(Type or print)

By: _____
(Individual's Signature)

Doing Business As: _____
(Type or print)

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: _____
(Type or print)

Title: _____
(Type or print)

Attest: _____
(Signature of Corporate Secretary)

A Corporation

Corporation Name: _____

State of Incorporation: _____

Type (General Business, Profession, Service, Limited Liability):

_____

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

Name: _____
(Type or print)

Title: _____
(Type or print)

Attest: _____ Corporate Seal
(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: _____
(Type or print)

Title: _____
(Type or print)

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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 the following items shall be included with the submitted bidding documents:

	-	Properly Executed Bid Form (Including the acknowledgement of all Addenda)
	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 be include an executed Power of Attorney.
	B1.	Identification of Minority Business Participation
	B2.	Affidavit A, Listing of Good Faith Efforts; or Affidavit B, Intent to Perform Contract with Own Workforce
	C	E-Verify
	D	Qualifications Statement (EJCDC C-451)

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BID BOND

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

BIDDER *(Name and Address)*:

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

OWNER *(Name and Address)*:

Town of Apex
73 Hunter Street
Apex, NC 27502-0250

BID

Bid Due Date:

Description *(Project Name— Include Location)*:

BOND

Bond Number:

Date:

Penal sum _____ $ _____
(Words) (Figures)

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

BIDDER	**SURETY**
_____ (Seal)	_____ (Seal)
Bidder's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	By: _____
Signature	Signature (Attach Power of Attorney)
_____	_____
Print Name	Print Name
_____	_____
Title	Title
Attest: _____	Attest: _____
Signature	Signature
Title	Title

Note: Addresses are to be used for giving any required notice.
Provide execution by any additional parties, such as joint venturers, if necessary.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.

3. This obligation shall be null and void if:

3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or

3.2 All Bids are rejected by Owner, or

3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.

6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after the Bid due date.

7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.

8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.

9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

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BID BOND

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

BIDDER *(Name and Address)*:

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

OWNER *(Name and Address)*:

Town of Apex
73 Hunter Street
Apex, NC 27502-0250

BID

Bid Due Date:

Description *(Project Name— Include Location)*:

BOND

Bond Number:

Date:

Penal sum _____ $ _____
(Words) (Figures)

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

BIDDER	**SURETY**
_____ (Seal)	_____ (Seal)
Bidder's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	By: _____
Signature	Signature (Attach Power of Attorney)
_____	_____
Print Name	Print Name
_____	_____
Title	Title
Attest: _____	Attest: _____
Signature	Signature
_____	_____
Title	Title

Note: Addresses are to be used for giving any required notice.
Provide execution by any additional parties, such as joint venturers, if necessary.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder any difference between the total amount of Bidder's Bid and the total amount of the Bid of the next lowest, responsible Bidder that submitted a responsive Bid as determined by Owner for the work required by the Contract Documents, provided that:

1.1 If there is no such next Bidder, and Owner does not abandon the Project, then Bidder and Surety shall pay to Owner the penal sum set forth on the face of this Bond, and

1.2 In no event shall Bidder's and Surety's obligation hereunder exceed the penal sum set forth on the face of this Bond.

1.3 Recovery under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.

3. This obligation shall be null and void if:

3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or

3.2 All Bids are rejected by Owner, or

3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.

6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after the Bid due date.

7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.

8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.

9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

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SECTION 00 43 14

POWER OF ATTORNEY, BID BOND

PAGE FOR ATTACHING

BID BOND

POWER OF ATTORNEY

END OF SECTION

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Attach to Bid Attach to Bid **Bidders must provide *either* Affidavit A or Affidavit B (not both)** Attach to Bid Attach to Bid

Identification of Minority Business Participation

I,_____,
(Name of Bidder)

do hereby certify that on this project, we will use the following minority business enterprises as construction subcontractors, vendors, suppliers or providers of professional services.

Firm Name, Address and Phone #	Work type	*Minority Category

*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

The total value of minority business contracting will be ($)_____.

Attach to Bid Attach to Bid **Bidders must provide *either* Affidavit A or Affidavit B (not both)** Attach to Bid Attach to Bid

State of North Carolina AFFIDAVIT A – Listing of Good Faith Efforts

County of _____

(Name of Bidder)

Affidavit of_____

I have made a good faith effort to comply under the following areas checked:

Bidders must earn at least 50 points from the good faith efforts listed for their bid to be considered responsive. (1 NC Administrative Code 30 I.0101)

- ☐ **1 – (10 pts)** Contacted minority businesses that reasonably could have been expected to submit a quote and that were known to the contractor, or available on State or local government maintained lists, at least 10 days before the bid date and notified them of the nature and scope of the work to be performed.
- ☐ **2 --(10 pts)** Made the construction plans, specifications and requirements available for review by prospective minority businesses, or providing these documents to them at least 10 days before the bids are due.
- ☐ **3 – (15 pts)** Broken down or combined elements of work into economically feasible units to facilitate minority participation.
- ☐ **4 – (10 pts)** Worked with minority trade, community, or contractor organizations identified by the Office of Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses.
- ☐ **5 – (10 pts)** Attended prebid meetings scheduled by the public owner.
- ☐ **6 – (20 pts)** Provided assistance in getting required bonding or insurance or provided alternatives to bonding or insurance for subcontractors.
- ☐ **7 – (15 pts)** Negotiated in good faith with interested minority businesses and did not reject them as unqualified without sound reasons based on their capabilities. Any rejection of a minority business based on lack of qualification should have the reasons documented in writing.
- ☐ **8 – (25 pts)** Provided assistance to an otherwise qualified minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisted minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help minority businesses in establishing credit.
- ☐ **9 – (20 pts)** Negotiated joint venture and partnership arrangements with minority businesses in order to increase opportunities for minority business participation on a public construction or repair project when possible.
- ☐ **10 - (20 pts)** Provided quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands.

The undersigned, if apparent low bidder, will enter into a formal agreement with the firms listed in the Identification of Minority Business Participation schedule conditional upon scope of contract to be executed with the Owner. Substitution of contractors must be in accordance with GS143-128.2(d) Failure to abide by this statutory provision will constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of the minority business commitment and is authorized to bind the bidder to the commitment herein set forth.

Date:_____ Name of Authorized Officer:_____

Signature:_____

Title:_____

SEAL

State of North Carolina, County of_____

Subscribed and sworn to before me this _____day of _____20____

Notary Public_____

My commission expires _____

MBForms

State of North Carolina --AFFIDAVIT B-- Intent to Perform Contract with Own Workforce.

County of _____

Affidavit of _____
(Name of Bidder)

In lieu of compliance with the Owner's Minority Business Participation Goals, I hereby certify that it is our intent to perform 100% of the work required for the _____

_____ contract.
(Name of Project)

In making this certification, the Bidder states that the Bidder does not customarily subcontract elements of this type project, and normally performs and has the capability to perform and will perform all elements of the work on this project with his/her own current work forces; and

The Bidder agrees to provide any additional information or documentation requested by the owner in support of the above statement.

The undersigned hereby certifies that he or she has read this certification and is authorized to bind the Bidder to the commitments herein contained.

Date: _____ Name of Authorized Officer: _____

Signature: _____

Title: _____

SEAL

State of North Carolina, County of _____

Subscribed and sworn to before me this _____ day of _____ 20___

Notary Public _____

My commission expires _____

State of North Carolina - AFFIDAVIT C - Portion of the Work to be Performed by Minority Firms

County of _____

(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)

If the portion of the work to be executed by minority businesses as defined in GS143-128.2(g) is equal to or greater than 10% of the bidders total contract price, then the bidder must complete this affidavit. This affidavit shall be provided by the apparent lowest responsible, responsive bidder within **72 hours** after notification of being low bidder.

Affidavit of _____ I do hereby certify that on the
(Name of Bidder)

_____
(Project Name)

Project ID# _____ Amount of Bid $ _____

I will expend a minimum of _____% of the total dollar amount of the contract with minority business enterprises. Minority businesses will be employed as construction subcontractors, vendors, suppliers or providers of professional services. Such work will be subcontracted to the following firms listed below. Attach additional sheets if required

Name and Phone Number	*Minority Category	Work description	Dollar Value

*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with Minority Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of this commitment and is authorized to bind the bidder to the commitment herein set forth.

Date: _____ Name of Authorized Officer: _____

SEAL

Signature: _____

Title: _____

State of North Carolina, County of _____

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

Notary Public _____

My commission expires _____

State of North Carolina AFFIDAVIT D – Good Faith Efforts

County of _____

(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)

If the goal of 10% participation by minority business **is not** achieved, the Bidder shall provide the following documentation to the Owner of his good faith efforts:

(Name of Bidder)

Affidavit of: _____

I do certify the attached documentation as true and accurate representation of my good faith efforts.

(Attach additional sheets if required)

Name and Phone Number	*Minority Category	Work description	Dollar Value

*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

Documentation of the Bidder's good faith efforts to meet the goals set forth in these provisions. Examples of documentation include, but are not limited to, the following evidence:

A. Copies of solicitations for quotes to at least three (3) minority business firms from the source list provided by the State for each subcontract to be let under this contract (if 3 or more firms are shown on the source list). Each solicitation shall contain a specific description of the work to be subcontracted, location where bid documents can be reviewed, representative of the Prime Bidder to contact, and location, date and time when quotes must be received.

B. Copies of quotes or responses received from each firm responding to the solicitation.

C. A telephone log of follow-up calls to each firm sent a solicitation.

D. For subcontracts where a minority business firm is not considered the lowest responsible sub-bidder, copies of quotes received from all firms submitting quotes for that particular subcontract.

E. Documentation of any contacts or correspondence to minority business, community, or contractor organizations in an attempt to meet the goal.

F. Copy of pre-bid roster.

G. Letter documenting efforts to provide assistance in obtaining required bonding or insurance for minority business.

H. Letter detailing reasons for rejection of minority business due to lack of qualification.

I. Letter documenting proposed assistance offered to minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letter of credit, including waiving credit that is ordinarily required.

Failure to provide the documentation as listed in these provisions may result in rejection of the bid and award to the next lowest responsible and responsive bidder.

Date:_____ Name of Authorized Officer:_____

Signature:_____

Title:_____

SEAL

State of North Carolina, County of _____

Subscribed and sworn to before me this _____day of _____20____

Notary Public_____

My commission expires _____

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SECTION 00 31 32.10

GEOTECHNICAL REPORT

GEOTECHNICAL REPORT WILL BE ISSUED AS PART OF A BID ADDENDUM OR BID MODIFICATION

END OF SECTION

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QUALIFICATIONS STATEMENT

THE INFORMATION SUPPLIED IN THIS DOCUMENT IS CONFIDENTIAL TO THE EXTENT PERMITTED BY LAWS AND REGULATIONS

1. SUBMITTED BY:

Official Name of Firm: _____

Address: _____

_____

_____

2. SUBMITTED TO: _____

3. SUBMITTED FOR: _____

Owner: _____

Project Name: _____

_____

_____

_____

TYPE OF WORK: _____

_____

_____

4. CONTRACTOR'S CONTACT INFORMATION

Contact Person: _____

Title: _____

Phone: _____

Email: _____

5. AFFILIATED COMPANIES:

Name: _____

Address: _____

_____

_____

6. TYPE OF ORGANIZATION:

☐ SOLE PROPRIETORSHIP

Name of Owner: _____

Doing Business As: _____

Date of Organization: _____

☐ PARTNERSHIP

Date of Organization: _____

Type of Partnership: _____

Name of General Partner(s): _____

_____

_____

☐ CORPORATION

State of Organization: _____

Date of Organization: _____

Executive Officers:

- President: _____

- Vice President(s): _____

_____

_____

- Treasurer: _____

- Secretary: _____

☐ LIMITED LIABILITY COMPANY

State of Organization: _____

Date of Organization: _____

Members: _____

_____

_____

_____

☐ JOINT VENTURE

Sate of Organization: _____

Date of Organization: _____

Form of Organization: _____

Joint Venture Managing Partner

- Name: _____

- Address: _____

_____

_____

Joint Venture Managing Partner

- Name: _____

- Address: _____

_____

Joint Venture Managing Partner

- Name: _____

- Address: _____

_____

7. LICENSING

Jurisdiction: _____

Type of License: _____

License Number: _____

Jurisdiction: _____

Type of License: _____

License Number: _____

8. CERTIFICATIONS

CERTIFIED BY:

Disadvantage Business Enterprise: _____

Minority Business Enterprise: _____

Woman Owned Enterprise: _____

Small Business Enterprise: _____

Other (_____): _____

9. BONDING INFORMATION

Bonding Company: _____

Address: _____

_____

Bonding Agent: _____

Address: _____

_____

_____

Contact Name: _____

Phone: _____

Aggregate Bonding Capacity: _____

Available Bonding Capacity as of date of this submittal: _____

10. FINANCIAL INFORMATION

Financial Institution: _____

Address: _____

_____

Account Manager: _____

Phone: _____

INCLUDE AS AN ATTACHMENT AN AUDITED BALANCE SHEET FOR EACH OF THE LAST 3 YEARS

11. CONSTRUCTION EXPERIENCE:

Current Experience:

List on **Schedule A** all uncompleted projects currently under contract (If Joint Venture list each participant's projects separately).

Previous Experience:

List on **Schedule B** all projects completed within the last 5 Years (If Joint Venture list each participant's projects separately).

Has firm listed in Section 1 ever failed to complete a construction contract awarded to it?

☐ YES ☐ NO

If YES, attach as an Attachment details including Project Owner's contact information.

Has any Corporate Officer, Partner, Joint Venture participant or Proprietor ever failed to complete a construction contract awarded to them in their name or when acting as a principal of another entity?

☐ YES ☐ NO

If YES, attach as an Attachment details including Project Owner's contact information.

Are there any judgments, claims, disputes or litigation pending or outstanding involving the firm listed in Section 1 or any of its officers (or any of its partners if a partnership or any of the individual entities if a joint venture)?

☐ YES ☐ NO

If YES, attach as an Attachment details including Project Owner's contact information.

12. SAFETY PROGRAM:

Name of Contractor's Safety Officer:_____

Include the following as attachments:

Provide as an Attachment Contractor's (and Contractor's proposed Subcontractors and Suppliers furnishing or performing Work having a value in excess of 10 percent of the total amount of the Bid) OSHA No. 500- Log & Summary of Occupational Injuries & Illnesses for the past 5 years.

Provide as an Attachment Contractor's (and Contractor's proposed Subcontractors and Suppliers furnishing or performing Work having a value in excess of 10 percent of the total amount of the Bid) list of all OSHA Citations & Notifications of Penalty (monetary or other) received within the last 5 years (indicate disposition as applicable) - IF NONE SO STATE.

Provide as an Attachment Contractor's (and Contractor's proposed Subcontractors and Suppliers furnishing or performing Work having a value in excess of 10 percent of the total amount of the Bid) list of all safety citations or violations under any state all received within the last 5 years (indicate disposition as applicable) - IF NONE SO STATE.

Provide the following for the firm listed in Section V (and for each proposed Subcontractor furnishing or performing Work having a value in excess of 10 percent of the total amount of the Bid) the following (attach additional sheets as necessary):

Workers' compensation Experience Modification Rate (EMR) for the last 5 years:

YEAR	_____	EMR	_____
YEAR	_____	EMR	_____
YEAR	_____	EMR	_____
YEAR	_____	EMR	_____
YEAR	_____	EMR	_____

Total Recordable Frequency Rate (TRFR) for the last 5 years:

YEAR	_____	TRFR	_____
YEAR	_____	TRFR	_____
YEAR	_____	TRFR	_____
YEAR	_____	TRFR	_____
YEAR	_____	TRFR	_____

Total number of man-hours worked for the last 5 Years:

YEAR	_____	TOTAL NUMBER OF MAN-HOURS	_____
YEAR	_____	TOTAL NUMBER OF MAN-HOURS	_____
YEAR	_____	TOTAL NUMBER OF MAN-HOURS	_____
YEAR	_____	TOTAL NUMBER OF MAN-HOURS	_____
YEAR	_____	TOTAL NUMBER OF MAN-HOURS	_____

Provide Contractor's (and Contractor's proposed Subcontractors and Suppliers furnishing or performing Work having a value in excess of 10 percent of the total amount of the Bid) Days Away From Work, Days of Restricted Work Activity or Job Transfer (DART) incidence rate for the particular industry or type of Work to be performed by Contractor and each of Contractor's proposed Subcontractors and Suppliers) for the last 5 years:

YEAR	_____	DART	_____
YEAR	_____	DART	_____
YEAR	_____	DART	_____
YEAR	_____	DART	_____
YEAR	_____	DART	_____

13. EQUIPMENT:

MAJOR EQUIPMENT:

List on **Schedule C** all pieces of major equipment available for use on Owner's Project.

I HEREBY CERTIFY THAT THE INFORMATION SUBMITTED HEREWITH, INCLUDING ANY ATTACHMENTS, IS TRUE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

NAME OF ORGANIZATION: _____

BY: _____

TITLE: _____

DATED: _____

NOTARY ATTEST:

SUBSCRIBED AND SWORN TO BEFORE ME

THIS _____ DAY OF _____, 20___

NOTARY PUBLIC - STATE OF _____

MY COMMISSION EXPIRES: _____

REQUIRED ATTACHMENTS

1. Schedule A (Current Experience).
2. Schedule B (Previous Experience).
3. Schedule C (Major Equipment).
4. Audited balance sheet for each of the last 3 years for firm named in Section 1.
5. Evidence of authority for individuals listed in Section 7 to bind organization to an agreement.
6. Resumes of officers and key individuals (including Safety Officer) of firm named in Section 1.
7. Required safety program submittals listed in Section 13.
8. Additional items as pertinent.

SCHEDULE A

CURRENT EXPERIENCE

Project Name	Owner's Contact Person	Design Engineer	Contract Date	Type of Work	Status	Cost of Work
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				

SCHEDULE B

PREVIOUS EXPERIENCE (Include ALL Projects Completed within last 5 years)

Project Name	Owner's Contact Person	Design Engineer	Contract Date	Type of Work	Status	Cost of Work
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				

SCHEDULE B

PREVIOUS EXPERIENCE (Include ALL Projects Completed within last 5 years)

Project Name	Owner's Contact Person	Design Engineer	Contract Date	Type of Work	Status	Cost of Work
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				
	Name: Address: Telephone:	Name: Company: Telephone:				

SCHEDULE C - LIST OF MAJOR EQUIPMENT AVAILABLE

ITEM	PURCHASE DATE	CONDITION	ACQUIRED VALUE

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EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

NOTICE OF AWARD

Date of Issuance:

Owner: Town of Apex | Owner's Contract No.:

Engineer: The Wooten Company | Engineer's Project No.: 2519-CK

Project: Pleasant Park 1.5 MG Elevated Water Tank | Contract Name:

Bidder:

Bidder's Address:

TO BIDDER:

You are notified that Owner has accepted your Bid dated [_____] for the above Contract, and that you are the Successful Bidder and are awarded a Contract for:

_____ .

The Contract Price of the awarded Contract is: $_____.

[4] 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. *[revise if multiple copies accompany the Notice of Award]*

☐ a set of the Drawings will be delivered separately from the other Contract Documents.

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

1. Deliver to Owner [4] counterparts of the Agreement, fully executed by Bidder.
2. Deliver with the executed Agreement(s) the Contract security *[e.g., performance and payment bonds]* and insurance documentation as specified in the Instructions to Bidders and General Conditions, Articles 2 and 6.
3. Other conditions precedent (if any):

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

Owner: Town of Apex
Authorized Signature

By: _____

Title: _____

Copy: Engineer

Acceptance of Notice

Receipt of the above Notice of Award is hereby acknowledged by _____

this the _____ day of _____, 20___.

By:_____ Title:_____

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

THIS AGREEMENT is by and between Town of Apex ("Owner") and

("Contractor").

Owner and Contractor hereby agree as follows:

ARTICLE 1 – WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows: 1.5 MGD elevated water tank (composite style), site clearing and grading, temporary and permanent driveway, electrical and associated accessories, landscaping, and 190 LF of 20-inch water main.

ARTICLE 2 – THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: Pleasant Park 1.5 MG Elevated Water Tank

ARTICLE 3 – ENGINEER

3.01 The part of the Project that pertains to the Work has been designed by The Wooten Company.

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

ARTICLE 4 – CONTRACT TIMES

4.01 *Time of the Essence*

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

4.02 *Contract Times: Days*

A. The Work will be substantially completed within 365 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 400 days 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 and other losses if the Work is not completed and Milestones not achieved within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize the delays, expense, and difficulties 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 $750 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified in Paragraph 4.02.A above for Substantial Completion until the Work is substantially complete.

2. Completion of Remaining Work: After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner $750 for each day that expires after such time until the Work is completed and ready for final payment.

3. Liquidated damages for failing to timely attain Substantial Completion and final completion are not additive and will not be imposed concurrently.

ARTICLE 5 – CONTRACT PRICE

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

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

B. For all Work, a Lump Sum of $_____.

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, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract

a. 95 percent of Work completed (with the balance being retainage). If the Work has been 50 percent completed as determined by Engineer, and if the character and progress of the Work have been satisfactory to Owner and Engineer, then as long as the character and progress of the Work remain satisfactory to Owner and Engineer, there will be no additional retainage; and

b. 95 percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).

B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 100 percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less 200 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

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

ARTICLE 7 – INTEREST

7.01 Interest on final payments due to prime contracts shall accrue in accordance with North Carolina General Statute 143-134.1.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

8.01 In order to induce Owner to enter into this Contract, Contractor makes the following representations:

A. Contractor has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.

B. Contractor has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Contractor is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

E. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (3) Contractor's safety precautions and programs.

F. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies,

or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.

G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

J. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 *Contents*

A. The Contract Documents consist of the following:

1. This Agreement.
2. Performance bond.
3. Payment bond.
4. Power of Attorney.
5. Certificate of Insurance.
6. General Conditions.
7. Supplementary Conditions.
8. Specifications as listed in the table of contents of the Project Manual.
9. Drawings (not attached but incorporated by reference) consisting of ___ sheets with each sheet bearing the following general title: Pleasant Park 1.5 MG Elevated Water Tank.
10. Addenda (numbers ___ to ___, inclusive).
11. Exhibits to this Agreement (enumerated as follows):
    a. Contractor's Bid (pages ___ to ___, inclusive), including E-Verify Affidavit.
    b. Notice of Award (pages ___ to ___, inclusive).
    c. Documentation submitted by Contractor prior to Notice of Award.
    d. Affidavits.
12. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
    a. Notice to Proceed.
    b. Work Change Directives.
    c. Change Orders.

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

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

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

ARTICLE 10 – MISCELLANEOUS

10.01 *Terms*

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

10.02 *Assignment of Contract*

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

10.03 *Successors and Assigns*

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

10.04 *Severability*

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

10.05 *Contractor's Certifications*

A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.05:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;

2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and

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

10.06 E-Verify

A. Contractor hereby acknowledges that "E-Verify" is the federal E-Verify program operated by the US Department of Homeland Security and other federal agencies which is used to verify the work authorization of newly hired employees pursuant to federal law and in accordance with Article 2, Chapter 64 of the North Carolina General Statutes. Contractor further acknowledges that all employers, as defined by Article 2, Chapter 64 of the North Carolina General Statutes, must use E-Verify and after hiring an employee to work in the United States, shall verify the work authorization of the employee through E-Verify in accordance with NCGS §64-26(a). Contractor hereby pledges, attests and warrants through execution of this Agreement that Contractor complies with the requirements of Article 2 of Chapter 64 of the North Carolina General Statutes and further pledges, attests and warrants that any subcontractors currently employed by or subsequently hired by Contractor shall comply with any and all E-Verify requirements. Failure to comply with the above requirements shall be considered a breach of this Agreement.

10.07 Iran Divestment Act Certification

A. N.C.G.S. 147-86.60 prohibits the State of North Carolina, a North Carolina local government, or any other political subdivision of the State of North Carolina from contracting with any entity that is listed on the Final Divestment List created by the North Carolina State Treasurer pursuant to N.C.G.S. 147-86.58. N.C.G.S. 147-86.59 further requires that contractors with the State, a North Carolina local government, or any other political subdivision of the State of North Carolina must not utilize any subcontractor found on the State Treasurer's Final Divestment List. As of the date of execution of this Agreement Contractor hereby certifies that it is not listed on the Final Divestment List created by the North Carolina State Treasurer and that Contractor will not utilize any subcontractors found on the Final Divestment List.

10.08 Anti-Human Trafficking

A. The Contractor warrants and agrees that no labor supplied by the Contractor or the Contractor's subcontractors in the performance of this Agreement shall be obtained by means of deception, coercion, intimidation or force, or otherwise in violation of North Carolina law, specifically Article 10A, Subchapter 3 of Chapter 14 of the North Carolina General Statutes, Human Trafficking.

10.09 Electronic Signature

A. Pursuant to Article 40 of Chapter 66 of the North Carolina General Statutes (the Uniform Electronic Transactions Act) this Agreement and all documents related hereto containing an electronic or digitized signature are legally binding in the same manner as are hard copy documents executed by hand signature. The Parties hereby consent to use electronic or digitized signatures in accordance with the Town's Electronic Signature Policy and intend to be bound by this Agreement and any related Contract Documents. If electronic signatures are used the Agreement shall be delivered in an electronic

record capable of retention by the recipient at the time of receipt.

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

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

OWNER:	CONTRACTOR:
Town of Apex	
Signature:	Signature:
Printed Name & Title: Randal E. Vosburg, Town Manager	Printed Name & Title:
	(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)
Attest:	Attest:
Title: Allen Coleman, Town Clerk	Title:
Address for giving notices:	Address for giving notices:
P.O. Box 250	
Apex, NC 27502-0250	
	License No.: *(where applicable)*

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

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

_____

Antwan Morrison, Finance Director

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TABLE OF CONTENTS

CONSTRUCTION SUBCONTRACT

THIS IS A CONSTRUCTION SUBCONTRACT
("Subcontract") effective as of _____ ("Subcontract Date") between

_____ ("Contractor") and

_____ ("Subcontractor").

Prime Contract: Contractor has entered into a contract ("Prime Contract") dated _____, with Town of Apex ("Owner").

Contractor and Subcontractor further agree as follows:

ARTICLE 1 – PRELIMINARY MATTERS

1.01 *Prime Contract*

The Prime Contract requires Contractor to perform and furnish construction labor, materials, equipment, and services in connection with the Project described therein. The Prime Contract (excluding compensation and other confidential information) is incorporated in this Subcontract by reference. Portions of the Prime Contract are attached as Exhibit 1 to this Subcontract; Subcontractor may review other non-confidential portions upon request. The Project described in the Prime Contract is summarized as follows:

_____

_____

_____

1.02 *Scope of Subcontract Work*

Contractor hereby retains Subcontractor to provide construction labor, materials, equipment, and services under this Subcontract described as follows:

[Here describe with specificity the scope of the Subcontract Work, or incorporate a scope of work exhibit. The subcontract scope of work will typically include specific reference to the portions of the Prime Contract—the Specification sections, Drawing numbers, etc.—that Subcontractor is responsible for performing.]

_____("Subcontract Work").

The express terms of this paragraph shall govern in establishing the Subcontract scope of work. The divisions and sections of the Prime Contract's Specifications and the identifications and organization of the Prime Contract's drawings do not control or limit Contractor in dividing the Work among subcontractors or suppliers, or delineating the work to be performed by, or obligations of any specific trade, including Subcontractor.

1.03 *Subcontract Documents*

The Subcontract Documents are identified in Article 14 of this Subcontract.

1.04 *Independent Contractor*

Subcontractor is an independent contractor, and is not an employee or partner of, or a joint-venturer with Contractor, and has no contractual relationship or privity with Owner or Owner's engineers or consultants.

ARTICLE 2 – OBLIGATIONS OF PRIME CONTRACT

2.01 *Incorporation of Prime Contract Obligations*

The Subcontractor is bound to the Contractor under the Subcontract to the same extent that the Contractor is bound to the Owner under the Prime Contract, and Subcontractor shall comply with all requirements, terms, and conditions of the Prime Contract that relate in any way to the performance and completion of the Subcontract Work. The obligation of the Subcontractor to comply with the requirements, terms, and conditions of the Prime Contract shall not provide any rights, benefits, or third-party beneficiary standing to the Subcontractor with respect to the Prime Contract.

2.02 *Precedence of Subcontract*

If a provision of this Subcontract conflicts with a provision of the Prime Contract, the terms of this Subcontract shall govern, unless under controlling laws the conflicted provision of the Prime Contract cannot be waived.

ARTICLE 3 – SUBCONTRACT TIMES

3.01 *Date for Completion*

The Subcontract Work will be completed in full on or before____. The Subcontractor shall provide all required submittals on a timely basis, and shall provide sufficient labor and materials to comply with the progress schedule and avoid delaying the progress of Contractor's work under the Prime Contract. The Subcontractor shall make modifications in the performance and completion of the Subcontract Work as necessary to comply with modifications, if any, in the Prime Contract's progress schedule. The Subcontractor shall coordinate its Subcontract Work with other subcontractors at the site to avoid interference and delays.

3.02 *Time of the Essence*

All time limits for completion of the Subcontract Work as stated in the Subcontract Documents are of the essence of the Subcontract.

3.03 *Damages for Late Completion*

Subcontractor and Contractor recognize that time is of the essence as stated above and that the Contractor will suffer financial loss if the Subcontract Work is not completed within the times specified in Paragraph 3.01 above, plus any extensions thereof allowed in accordance with Article 9 of the Subcontract. The damages resulting to the Contractor may include liquidated damages, special damages, and other damages (if any) assessed by the Owner, actual damages claimed by the Owner as a result of the delay, and the Contractor's costs for extended general conditions, field overhead, and home office overhead. Therefore, in the event that Subcontractor fails to complete the Subcontract Work within the time limits stated in Paragraph 3.01 above, plus any extensions thereof allowed in

accordance with Article 9 of the Subcontract, and without limiting any additional remedies available to Contractor, Subcontractor shall pay Contractor the share of the delay damages and costs incurred by Contractor that are attributable to Subcontractor.

ARTICLE 4 – SUBCONTRACT PRICE

4.01 *Payment Obligation*

Contractor shall pay Subcontractor for completion of the Subcontract Work in accordance with the Subcontract Documents an amount equal to the sum of the amounts determined pursuant to the paragraphs below:

A. For all Subcontract Work other than Unit Price Work, a lump sum of: $_____

1. *Cash Allowances*: All specific cash allowances are included in the above price and include the cost to Subcontractor (less any applicable trade discounts) of materials and equipment required by the cash allowances to be delivered at the site, and all applicable taxes. Subcontractor'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 Subcontract Price, and no demand for additional payment on account of any of the foregoing will be valid.

B. For all Unit Price Work, an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work multiplied by the actual quantity of that item:

UNIT PRICE SUBCONTRACT WORK					
Item No.	Description	Unit	Estimated Quantity	Unit Price	Extended Price
Total of all Extended Prices (Unit Price Subcontract Work)				$	

The extended prices for Unit Price Work set forth as of the Subcontract Date are based on estimated quantities. Estimated quantities are not guaranteed, and determinations of actual quantities will be verified by the Contractor and shall be subject to any applicable procedures for measurement and verification under the Prime Contract.

ARTICLE 5 – PAYMENT PROCEDURES

5.01 *Progress Payments*

A. *Applications for Payments*

1. Ten days prior to the date established in the Prime Contract for submission by the Contractor of the Contractor's application for each progress payment (but not more often than once a month), Subcontractor shall submit to Contractor for review a draft progress payment application covering the Subcontract Work completed as of the date of the progress payment application. The amount requested under each progress payment application shall be calculated in accordance with Article 4, and: (a) for lump sum work by determining the percentage of the Subcontract Work completed as of the date of the progress payment application; (b) for unit price work by applying unit prices

to units provided; (c) subject to subtraction to account for amounts previously paid. Subcontractor's progress payments shall be subject to the retainage provisions of the Prime Contract.

2. Each Subcontractor progress payment application shall be accompanied by supporting documentation required by the Owner to be attached to the Contractor's progress payment submission, as required by the Prime Contract. The progress payment application shall also be accompanied by required lien waivers; a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all liens; and for stored material and equipment, evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein. All such supporting documentation must be satisfactory to Contractor and Owner.

3. Beginning with Subcontractor's second progress payment application, each Subcontractor progress payment application shall include a Subcontractor's affidavit stating that all previous progress payments received on account of the Subcontract Work have been paid to persons and entities providing labor, equipment, materials and services on account of amounts received on behalf of said sub-subcontractors, suppliers, and vendors from prior progress payment applications. Each Subcontractor's affidavit shall list all sub-subcontractors, suppliers, and vendors having contracts with Subcontractor to provide said labor, equipment, material, and services on the Project including the amount of each contract, the amount paid to date and the amount due or to become due to each sub-subcontractor, supplier, and vendor. Each progress payment application shall also include lien waivers executed by each sub-subcontractor, supplier, and vendor listed on the Subcontractor's affidavit.

B. *Review of Applications*

1. Within five days after receipt of each draft progress payment application submitted by Subcontractor, Contractor will return the draft progress payment application with corrections (if any). Subcontractor will submit a final progress payment application, incorporating all resolved corrections, together with all supporting documentation, within three days thereafter.

2. Contractor may withhold amounts requested in one or more payment applications from the Subcontractor in whole or part if:

   a. the Subcontract Work is defective, or completed Subcontract Work has been damaged, requiring correction or replacement;

   b. the Subcontract Price has been reduced by change orders;

   c. the Contractor has been required to correct defective Subcontract Work or complete Subcontract Work;

   d. claims have been made against Contractor on account of Subcontractor's performance or furnishing of the Subcontract Work;

   e. liens have been filed in connection with the Subcontract Work, except where Subcontractor has delivered a specific bond satisfactory to Contractor and Owner to secure the satisfaction and discharge of such liens;

f. the Owner has exercised a set-off against payments to Contractor attributable to Subcontractor's activities or performance of the Subcontract Work;

g. The Subcontractor has defaulted under the terms of the Subcontract.

C. *Payment:* Contractor shall pay Subcontractor any amounts due to Subcontractor under a payment application for Subcontract Work within ten days after Contractor's receipt from the Owner of payment for such Subcontract Work.

ARTICLE 6 – FINAL PAYMENT AND COMPLETION

6.01 *Final Payment*

Upon final completion of obligations under the Subcontract, including acceptance by Owner (or its representative) of the Subcontract Work as part of the Work under the Prime Contract, and submission and acceptance of all close-out documents required under the Subcontract, Subcontractor shall submit to Contractor an application for final payment and release of retainage, if any. Final payment becomes due ten days after Contractor's receipt of payment from the Owner of amounts requested on behalf of Subcontractor. Contractor's receipt of payment of retainage withheld by Owner from amounts due to Contractor for the Subcontract Work is an express condition precedent to Contractor's obligation to pay such retainage to Subcontractor.

6.02 *Final Lien Waivers*

Upon the request of Contractor, Subcontractor shall submit, as part of the application for final payment, a final waiver of lien and sworn statement indicating all sub-subcontractors, suppliers, and vendors, their contract amounts, and the final amounts paid to each sub-subcontractor, supplier, and vendor.

6.03 *Warranty of Title*

Subcontractor warrants and guarantees that title to all Subcontract Work, materials, and equipment furnished under the Subcontract will pass to Owner free and clear of all liens and other title defects, and all patent, licensing, copyright, or royalty obligations.

6.04 *Waiver of Claims*

Final payment by Contractor to Subcontractor shall constitute:

A. a waiver of all claims by Contractor against Subcontractor, except claims arising from unsettled liens, from defective Subcontract Work appearing after final inspection, from failure to comply with the Subcontract Documents or the terms of any special guarantees specified therein, or from Subcontractor's continuing obligations under the Prime Contract; and

B. a waiver of all claims by Subcontractor against Contractor other than those previously made in accordance with the requirements herein that remain unsettled.

ARTICLE 7 – SUB-SUBCONTRACTORS

7.01 *Subcontractor's Responsibility*

Subcontractor shall be fully responsible to Contractor for all acts and omissions of the sub-subcontractors, suppliers, and other individuals or entities performing or furnishing any of the Subcontract Work just as Subcontractor is responsible for Subcontractor's own acts and omissions.

7.02 *No Third-Party Relationships*

Nothing in the Subcontract Documents shall create for the benefit of any such sub-subcontractor, supplier, or other individual or entity any contractual relationship between Contractor, Owner, or Owner's engineers or consultants and any such sub-subcontractor, supplier or other individual or entity; nor shall anything in the Subcontract Documents create any obligation on the part of Contractor, Owner, or Engineer to pay or to see to the payment of any money due any such sub-subcontractor, supplier, or other individual or entity, except as may otherwise be required by laws and regulations.

ARTICLE 8 – PERFORMANCE OF THE SUBCONTRACT WORK

8.01 *Subcontractor's Obligations*

Subcontractor shall provide all material, equipment, services, and labor necessary for the completion of the Subcontract Work. All materials and equipment shall be as specified in the Subcontract Documents and be of good quality and new, except as otherwise provided in the Subcontract Documents. Subcontractor shall provide Contractor with such information and test results required under the Prime Contract to verify the quality of the materials and equipment furnished under the Subcontract Documents.

8.02 *Verification of Existing Conditions*

The dimensions, locations, and limits of the Subcontract Work are shown or indicated in the Subcontract Documents. The Contractor has used reasonable efforts to verify the accuracy of said information but takes no responsibility for the verification of information concerning actual conditions affecting the Subcontract Work. Subcontractor has an independent obligation to verify actual conditions, including but not limited to dimensions, locations, and limits, prior to ordering equipment and materials and performing the Subcontract Work, and shall be responsible for all costs and expenses resulting from the failure to verify such information.

8.03 *Supervision*

A. At all times during the progress of the Subcontract Work, Subcontractor shall assign an authorized representative to provide competent, on-site supervision. Such representative shall not be replaced without written notice to Contractor except under extraordinary circumstances.

B. Subcontractor shall be solely responsible for scheduling and coordinating the work of sub-subcontractors, suppliers, and other individuals or entities performing or furnishing any of the Subcontract Work under a direct or indirect contract with Subcontractor.

C. Subcontractor shall supervise, inspect, and direct the Subcontract Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Subcontract Work in accordance with the Subcontract Documents.

8.04 *Coordination with Other Subcontractors*

Subcontractor shall cooperate with other subcontractors and coordinate its Subcontract Work and schedule with other subcontractors on the Project. Subcontractor shall attend coordination meetings and use its best efforts to resolve all conflicts with other subcontractors without the intervention of Contractor. If a conflict cannot be resolved without the intervention of Contractor, the decision of Contractor regarding resolution of the conflict shall be final. Subcontractor shall not damage the work of other subcontractors or others working at the site, and shall be responsible for the cost of damage caused by the operations of Subcontractor to the work of others.

8.05 *Prosecution of the Subcontract Work*

A. *Clean-up:* On not less than a daily basis, Subcontractor shall be responsible for cleaning up and removing all debris and waste resulting from the Subcontract Work, to avoid interference with the work and progress of others at the site. If Subcontractor fails to clean up and remove waste and debris in accordance with this provision, Contractor may provide for clean-up and removal of waste and debris at Subcontractor's expense.

B. *Hoisting and Lifting*: Subcontractor shall provide all hoisting and lifting required for the Subcontract Work, unless Contractor has otherwise expressly agreed to provide hoisting, lifting, or both.

C. *Temporary Utility Services and Temporary Facilities*: Subcontractor shall at its expense provide temporary utility services and temporary facilities needed for the performance of the Subcontract Work, except those temporary utility services and temporary facilities that Contractor has expressly agreed to provide at its expense.

D. *Safety and Protection:*

1. Subcontractor shall perform the Subcontract Work in a safe manner, taking full responsibility for the prevention of harm or injury to its workforce, and taking all reasonable steps necessary to protect from harm, injury, or damage all persons, property, structures, materials, and equipment at or adjacent to the Subcontractor's work areas.

2. Subcontractor shall comply with the safety programs of the Owner and Contractor, when Subcontractor has been made aware of such requirements in writing.

3. Subcontractor shall coordinate the safety of its employees, Subcontractor's lower-tier subcontractors, and Subcontractor's suppliers with Contractor's safety representative, and shall comply with all applicable OSHA and other laws and regulations related to safety and protection. Subcontractor shall ensure that its employees and the on-site employees of Subcontractor's lower-tier subcontractors and suppliers are properly trained and understand (a) Owner's, Contractor's, and Subcontractor's safety requirements, and (b) applicable safety laws and regulations. Subcontractor is responsible for furnishing to Contractor and others as applicable all required material safety data sheets.

4. Subcontractor shall report promptly to Contractor all injuries, accidents, and damage that occurs during the performance of the Subcontract Work, and all failures or near-miss events that could have resulted in serious injury, even if no serious injury actually occurred.

E. *Labor*: Subcontractor shall comply with applicable labor and jurisdictional requirements to prevent strikes and other work stoppages and slowdowns that would interfere with the Subcontract Work and the work of others. Subcontractor shall be responsible for delays resulting from Subcontractor's violation of this provision.

F. *Communications with Owner and Engineer*: Subcontractor shall communicate with Owner, Owner's engineers, and Owner's other representatives solely through Contractor, with the following limited exceptions: (1) in the case of an emergency, Subcontractor may communicate directly with any entity or individual in the interests of safety and protection of property, (2) Subcontractor may directly request Owner to provide information about amounts paid to Contractor on account of Subcontract Work performed, and (3) Subcontractor may directly request Owner to provide Subcontractor with a copy of any payment bond furnished by Contractor.

8.06 *Correction and Warranties*

A. Subcontractor warrants and guarantees to Contractor that all Subcontract Work will be in accordance with the Subcontract Documents and will not be defective. Subcontractor's warranty and guarantee hereunder excludes defects or damage caused by abuse, modification, or improper maintenance or operation by persons other than Subcontractor and its sub-subcontractors, suppliers, or any other individual or entity for whom Subcontractor is responsible; or normal wear and tear under normal usage.

B. Subcontractor's obligation to perform and complete the Subcontract Work in accordance with the Subcontract Documents shall be absolute and Subcontractor shall be fully responsible for the Subcontract Work under the Subcontract to the same extent that Contractor is responsible for the Subcontract Work to the Owner under the Prime Contract.

C. Subcontractor shall correct the Subcontract Work to the same extent that Contractor is required to correct its work (including the Subcontract Work) under the Prime Contract. Subcontractor shall correct Subcontract Work whether or not installed or completed. If the Subcontract Work has been rejected, Subcontractor shall remove such rejected Subcontract Work from the Project at the direction of Contractor, and replace it with Subcontract Work that is not defective. For a period of one year after final completion of the Subcontract Work, or no less than any period required under the Prime Contract relative to the Subcontract Work, and promptly after receipt of written notice, Subcontractor shall correct all defective Subcontract Work as directed by Contractor. Subcontractor shall indemnify Contractor, Owner, Owner's engineers and consultants, for 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 such correction or removal (including but not limited to all costs of repair or replacement of work of others). All such correction obligations are in addition to the warranty, guarantee, and contractual duties established above and elsewhere in the Subcontract Documents.

D. The obligations under this Paragraph 8.06 shall survive completion of the Subcontract Work and, when the Prime Contract is complete and ready for final payment by Owner, Contractor may assign its rights

under this Paragraph 8.06 to Owner upon agreement between Owner and Contractor and notice to Subcontractor.

ARTICLE 9 – CHANGES TO THE SUBCONTRACT

9.01 *Changes*

A. Without invalidating the Subcontract, Contractor may, at any time or from time to time, order changes to the Subcontract Work including additions, deletions, or revisions in the Subcontract Work. Subcontractor shall promptly proceed with the Subcontract Work as changed. All changed Subcontract Work will be performed under the applicable conditions of the Subcontract Documents. Subcontractor shall not perform any changes to the Subcontract Work that would increase the Subcontract Price or Subcontract Times without express written authority from Contractor.

B. Subcontractor shall deliver notice of each request for a change in compensation or time within seven days of the associated directive to perform changed Subcontract Work, and not later than two days before Prime Contract requirements relative to submitting claims and change proposals.

C. Changes in the Subcontract Price for changed Subcontract Work shall be made on the basis of either a mutually acceptable lump sum price, or under unit prices consistent with the unit prices set forth in the Subcontract as of the Subcontract Date. To the extent the changed Subcontract Work has no predetermined costs or unit prices under the original Subcontract, and the parties do not agree to a lump sum for the changed Subcontract Work, the amount of the request for changed compensation shall be based upon Subcontractor's cost of labor (consistent with any applicable rates negotiated under the original Subcontract), plus the direct costs of sub-subcontracts, materials and equipment to be consumed or incorporated in the changed Subcontract Work, plus overhead and profit consistent with the price negotiated for the original Subcontract Work and subject to approval by Contractor.

D. To the extent that a change to the Subcontract Work resulted from a revision of the Prime Contract, the compensation to Subcontractor for such changed Subcontract Work will be limited to the share of the compensation received by Contractor from Owner for such revision that is attributable to the change in the Subcontract Work. In the event that the revision results in a deduction of the Subcontract Price, the deduction shall be based upon the share of the deduction assessed against Contractor under the Prime Contract that is attributable to the change in Subcontract Work.

ARTICLE 10 – BONDS, INSURANCE, AND INDEMNIFICATION

10.01 *Performance Bond, Payment Bond, and Other Bonds*

A. If expressly listed as Subcontract Documents in Article 14, or expressly required of Subcontractor elsewhere in the Subcontract Documents, Subcontractor shall at its expense furnish a performance bond and a payment bond, each in an amount equal to or greater than the Subcontract Price, as security for the faithful performance and payment of all of Subcontractor's obligations under the Subcontract Documents. If the Subcontract Documents as of the Subcontract Date do not require performance and payment bonds, but Contractor subsequently instructs Subcontractor to furnish such bonds, Subcontractor shall do so at Contractor's expense.

B. The performance and payment bonds shall remain in effect until not less than the longer of: (1) one year after the date when final payment becomes due from Contractor; or (2) completion of the

correction period specified in this Subcontract, except as provided otherwise by applicable laws or regulations. Subcontractor shall also furnish such other bonds as are required by the Subcontract Documents.

C. All bonds shall be in the form prescribed by the Subcontract Documents except as provided otherwise by laws or regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

D. Subcontractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.

E. If the surety on a bond furnished by Subcontractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Subcontractor shall promptly notify Contractor and shall, within 20 days after the event giving rise to such notification, furnish another bond and surety, both of which shall comply with the bond and surety requirements above.

F. If the Subcontract requires Subcontractor to provide its own performance bond and payment bond, as described in Paragraphs 10.01.A through D, the Contractor may, at its sole discretion, provide such bonds for the Subcontractor, either as individual instruments or as a part of Contractor's bonding. In such case Subcontractor shall be responsible to Contractor for a proportionate share of Contractor's bond costs, computed as the percentage of the total Subcontract Price relative to the total bonded Contract Price, and the Subcontract Price shall be adjusted accordingly.

G. As an alternative to requiring Subcontractor to provide or contribute to the cost of performance bonds or payment bonds as described in Paragraphs 10.01.A through E, the Contractor may, at its sole discretion, waive such requirements for this Subcontract, and the Subcontract Price shall be adjusted accordingly.

H. If Subcontractor has failed to obtain a required bond, Contractor may exclude the Subcontractor from the site and exercise Contractor's termination rights under Article 11.

I. Upon request, Contractor shall provide a copy of the payment bond to any subcontractor, supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Subcontract Work.

10.02 *Insurance—General Provisions*

A. Subcontractor shall obtain and maintain insurance as required in this Article and in any Subcontract exhibit or supplementary Subcontract Document regarding insurance.

B. All insurance required by the Subcontract to be purchased and maintained by Subcontractor 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 elsewhere in the Subcontract Documents, all companies that provide insurance policies required under this Subcontract shall have an A.M. Best rating of A-VII or better.

C. Subcontractor shall deliver to Contractor, with copies to each named insured and additional insured (as identified here or elsewhere in the Subcontract Documents), certificates of insurance establishing that Subcontractor has obtained and is maintaining the policies, coverages, and endorsements required by the Subcontract. Upon request by Contractor or any other insured, Subcontractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Subcontractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

D. Failure of Contractor to demand such certificates or other evidence of the Subcontractor's full compliance with these insurance requirements, or failure of Contractor to identify a deficiency in compliance from the evidence provided, shall not be construed as a waiver of the Subcontractor's obligation to obtain and maintain such insurance.

E. If Subcontractor does not purchase or maintain all of the insurance required of it by this Subcontract, the Subcontractor shall notify Contractor in writing of such failure to purchase prior to the start of the Subcontract Work, or of such failure to maintain prior to any change in the required coverage.

F. If Subcontractor has failed to obtain and maintain required insurance, Contractor may exclude the Subcontractor from the site and exercise Contractor's termination rights under Article 11.

G. Without prejudice to any other right or remedy, if Subcontractor has failed to obtain required insurance, Contractor may elect to obtain equivalent insurance to protect Contractor's interests at the expense of Subcontractor, and the Subcontract Price shall be adjusted accordingly.

H. Contractor does not represent that insurance coverage and limits established in this Subcontract necessarily will be adequate to protect Subcontractor or Subcontractor's interests.

I. The insurance and insurance limits required herein shall not be deemed as a limitation on Subcontractor's liability under the indemnities granted to Contractor and other individuals and entities in the Contract Documents.

10.03 *Subcontractor's Insurance*

A. *Workers' Compensation:* Subcontractor 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 (if applicable) and Jones Act coverage (if applicable).

3. claims for damages because of bodily injury, occupational sickness or disease, or death of Subcontractor's employees (by stop-gap endorsement in monopolist worker's compensation states).

4. Foreign voluntary worker compensation (if applicable).

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

1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Subcontractor's employees.

2. claims for damages insured by reasonably available personal injury liability coverage.

3. claims for damages, other than to the Subcontract Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.

C. *Commercial General Liability—Form and Content:* Subcontractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:

1. Products and completed operations coverage:

a. Such insurance shall remain in effect for three years after final payment.

b. Subcontractor shall furnish Contractor and each other additional insured (as identified in this Article or elsewhere in the Subcontract Documents) evidence of continuation of such insurance at final payment and three years thereafter.

2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Subcontractor's contractual indemnity obligations under the Subcontract Documents.

3. Broad form property damage coverage.

4. Severability of interest.

5. Underground, explosion, and collapse coverage.

6. Personal injury coverage.

7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 **and** CG 20 37 10 01 (together); or CG 20 10 07 04 **and** CG 20 37 07 04 (together); or their equivalent.

8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.

D. *Automobile liability:* Subcontractor shall purchase and maintain automobile liability insurance against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.

E. *Umbrella or excess liability:* Subcontractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.

F. *Subcontractor's pollution liability insurance:* Subcontractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result of pollution conditions arising from Subcontractor's operations and completed operations. The completed operations coverage shall remain in effect for no less than three years after final completion.

G. *Additional insureds:* The Subcontractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Contractor, Owner, and Owner's engineers, architects, and consultants, and any individuals or entities identified as additional insureds elsewhere in the Subcontract Documents; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Subcontractor shall obtain all necessary endorsements to support these requirements.

H. *Subcontractor's professional liability insurance:* If Subcontractor will provide or furnish professional services under this Subcontract, through a delegation of professional design services or otherwise, then Subcontractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design services and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Subcontract and for a minimum of two years after substantial completion of the Project. If such professional design services are performed by a lower-tier subcontractor, and not by Subcontractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such lower-tier subcontractor.

I. *General provisions:* The policies of insurance required by this Paragraph 10.03 shall:

1. include at least the specific coverages provided in this Subcontract.

2. be written for not less than the limits of liability expressly provided in this Subcontract, including any Subcontract exhibit or supplementary Subcontract Document specifying insurance policy limits, or if no such express insurance limits are set forth in the Subcontract, then for not less than the limits required of Contractor by Owner in the Prime Contract, for the corresponding types of insurance. If laws or regulations require a higher limit, then Subcontractor shall meet such legal requirement.

3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 10 days prior written notice has been given to Subcontractor. Within three days of receipt of any such written notice, Subcontractor shall provide a copy of the notice to Contractor and each other insured under the policy.

4. remain in effect at least until final payment (and longer if expressly required herein) and at all times thereafter when Subcontractor may be correcting, removing, or replacing defective Subcontract Work as a warranty or correction obligation, or otherwise, or returning to the site to conduct other tasks arising from the Subcontract Documents.

5. be appropriate for the Subcontract Work being performed and provide protection from claims that may arise out of or result from Subcontractor's performance of the Subcontract Work and Subcontractor's other obligations under the Subcontract Documents, whether it is to be performed by Subcontractor, any lower-tier subcontractor or supplier, or by anyone directly or indirectly employed by any of them to perform any of the Subcontract Work, or by anyone for whose acts any of them may be liable.

J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

K. Subcontractor waives all rights against Owner, Contractor, and all individuals or entities identified in the Prime Contract's Supplementary Conditions to be listed as insureds or additional insureds under the builder's risk, installation floater, or other forms of property insurance, and against the Owner's engineers and consultants, and their consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such builder's risk, installation floater, or other form of property insurance applicable to the work under the Prime Contract.

L. If Contractor is responsible under the Prime Contract and any builder's risk or other property insurance policy for the payment of a deductible, or an amount within a deductible, and the need to pay such deductible or amount within a deductible is attributable in whole or part to the actions or inactions of Subcontractor, its sub-subcontractors, employees, agents, or others for which Subcontractor is responsible, then Subcontractor shall pay its attributable share of such deductible.

M. Upon request the Contractor shall provide to Subcontractor a copy of any builder's risk, installation floater, or other property insurance policy applicable to the work under the Prime Contract. Contractor may block out (redact) any confidential premium or pricing information contained in any such policy. Subcontractor may elect to obtain other insurance at its expense, if it concludes that its interests are not insured under such policy.

10.04 *Indemnification*

A. To the fullest extent permitted by laws and regulations, Subcontractor shall indemnify and hold harmless Contractor, Owner, and Owner's engineers and consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Subcontract Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Subcontract Work itself), including the loss of use resulting therefrom, but only to the extent caused by any negligent act or omission of Subcontractor, any lower tier subcontractor, supplier, or any individual or entity directly or

indirectly employed by any of them to perform any of the Subcontract Work or anyone for whose acts any of them may be liable.

B. In any and all claims against Contractor, Owner, or Owner's engineers or consultants, 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 Subcontractor, any lower tier subcontractor, any supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Subcontract Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 10.04.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Subcontractor, lower tier subcontractor, supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of Subcontractor under Paragraph 10.04.A shall not extend to the liability of Owner's engineers and consultants and their officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve maps, drawings, opinions, reports, surveys, change orders, designs, or specifications; or

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

D. With respect to the Subcontract Work, and to the fullest extent permitted by law, Subcontractor shall assume the same or corresponding responsibilities as Contractor for all indemnity obligations of Contractor set forth in the Prime Contract.

ARTICLE 11 – SUSPENSION AND TERMINATION

11.01 *Contractor May Suspend Work*

A. In the event that Owner suspends the work of Contractor under the Prime Contract, Contractor may suspend the performance of the Subcontract or any portion thereof for a period of not more than 90 consecutive days, by giving notice in writing to Subcontractor of such suspension. Subcontractor shall resume the Subcontract Work when instructed by Contractor to do so. Subcontractor shall be granted an adjustment in the Subcontract Price or an extension of the Subcontract Times, or both, directly attributable to any such suspension only to the extent that Contractor receives an adjustment of the Prime Contract price or the Prime Contract time for the Subcontractor's proportionate share of work under the Prime Contract.

B. Contractor may suspend the Subcontract Work for a period of not more than 90 days, or to the extent permitted by the progress schedule or any express provision of the Subcontract Documents, for Contractor's own purposes.

C. Contractor may suspend the work of Subcontractor with all costs and liability for any delay in the Subcontract Work and others to be assessed against the Subcontractor for the following Subcontract violations until the Subcontractor demonstrates it has cured the violations as follows:

1. Subcontractor fails to comply with the Owner's or Contractor's safety program;

2. Subcontractor or its employees are in violation of OSHA or state or local safety laws or regulations;

3. Subcontractor has installed defective Subcontract Work that is not in compliance with the Subcontract Documents and has failed to cure the defective Subcontract Work;

4. Subcontractor has violated any laws or regulations applicable to the performance of the Subcontract Work;

5. Subcontractor has failed to pay a supplier or lower-tier subcontractor pursuant to Subcontractor's legal or contractual obligations.

D. If Subcontractor fails to comply with the progress schedule, causing delay to the Subcontract Work or the Prime Contract work, after three days notice by Contractor and failure of Subcontractor to demonstrate that it has implemented procedures to comply with the schedule through measures such as providing supplemental labor, materials, and tools, then Contractor may implement its own procedures to meet the schedule, by providing supplemental labor, materials, tools, or taking other measures, through its own or other forces, and Contractor may assess the cost of such supplemental procedures against the Subcontract.

11.02 *Contractor May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. Subcontractor's persistent failure to perform the Subcontract Work in accordance with the Subcontract Documents (including, but not limited to, failure to supply sufficient skilled workers, suitable materials, or equipment, or failure to adhere to the Subcontract progress schedule);

2. Subcontractor's disregard of laws or regulations of any public body having jurisdiction;

3. Subcontractor's repeated disregard of the authority of Contractor; or

4. Subcontractor's failure to perform or otherwise to comply with a material term of the Subcontract.

B. If one or more of the events identified in the preceding paragraph occur, Contractor may, after giving Subcontractor seven days written notice of its intent to terminate the services of Subcontractor, or in the event the Subcontractor provided a performance bond covering the Subcontract the Contractor may provide notice to the Subcontractor and surety in accordance with the requirements of the applicable performance bond of its intent to terminate the services of Subcontractor to preserve Contractor's rights under the performance bond. Upon termination of the Subcontract, Contractor may:

1. exclude Subcontractor from the site, and take possession of the Subcontract Work and of all Subcontractor's tools, appliances, construction equipment, and machinery at the site, and use the same to the full extent they could be used by Subcontractor.

2. incorporate in the Subcontract Work all materials and equipment stored at the site or for which Contractor has paid Subcontractor but which are stored elsewhere; and

3. complete the Subcontract Work as Contractor may deem expedient.

C. If Contractor proceeds as provided in Paragraph 11.02.B, Subcontractor shall not be entitled to receive any further payment until the Subcontract Work is completed. If the unpaid balance of the Subcontract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor arising out of or relating to completing the Subcontract Work, such excess will be paid to Subcontractor. If such claims, costs, losses, and damages exceed such unpaid balance, Subcontractor shall pay the difference to Contractor. When exercising any rights or remedies under this paragraph, Contractor shall not be required to obtain the lowest price for the Subcontract Work performed.

D. Notwithstanding Paragraphs 11.02.A and 11.02.B, Subcontractor's services will not be terminated if Subcontractor begins within four days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 14 days of receipt of said notice. If the Subcontractor fails to cure within 14 days of receipt of said notice, the Subcontract shall be deemed terminated in accordance with provisions 11.02.A through 11.02.C upon two days notice by the Contractor following the 14-day period.

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

F. If and to the extent that Subcontractor has provided a performance bond, the termination procedures of that bond shall supersede the procedures in Paragraphs 11.02.B and 11.02.C.

11.03 *Termination of Contractor or Rejection of Subcontract By Owner*

A. The Contractor may terminate the Subcontract at any time, if the Prime Contract is terminated by the Owner, or if Owner rejects the Subcontract in accordance with the terms of the Prime Contract, the Contractor may terminate the Subcontract without penalty.

B. In the event of a termination pursuant to Article 11.03, the costs and expenses to be paid to Subcontractor resulting from a termination under this provision shall be limited to the costs and expenses recovered by Contractor from Owner on Subcontractor's behalf.

11.04 *Contractor May Terminate For Convenience*

A. Upon seven days written notice to Subcontractor, Contractor may, without cause and without prejudice to any other right or remedy of Contractor, terminate the Subcontract. In such case, Subcontractor shall be paid for (without duplication of any items):

1. completed and acceptable Subcontract Work executed in accordance with the Subcontract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Subcontract Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Subcontract in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

3. reasonable expenses directly attributable to termination.

B. Subcontractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

11.05 *Subcontractor May Stop Work or Terminate*

A. If, through no act or fault of Subcontractor, Contractor after receipt of payment from Owner fails to make payment due Subcontractor, for more than 30 days after payment is due, then Subcontractor may, upon seven days written notice to Contractor, and provided Contractor does not remedy such suspension or failure within seven days thereafter, terminate the Subcontract and recover payment from Contractor subject to the terms of this Subcontract.

B. As an alternative to terminating the Subcontract and without prejudice to any other right or remedy, if a payment owed to Subcontractor is more than 30 days past due, then Subcontractor may, seven days after written notice to Contractor, stop the Subcontract Work until payment is made of all such amounts due Subcontractor, including interest thereon at an annual rate of five percent per annum, or if applicable at the rate prescribed by law, without penalty.

C. If the Contractor suspends the Subcontractor's work for more than 120 days, the Subcontractor may upon seven days written notice terminate the Subcontract and recover the amounts due the Subcontractor for Subcontract Work completed as of the date of termination, including retainage withheld from the Subcontractor to date and interest thereon at an annual rate of five percent per annum, or if applicable at the rate prescribed by law, without penalty.

ARTICLE 12 – CLAIMS AND DISPUTE RESOLUTION

12.01 *Claims*

A. As a condition precedent to any consideration, pursuit, or recovery by Subcontractor of any claim seeking an increase in Subcontract Price, Subcontract Time, or both, Subcontractor shall provide notice of any claim to Contractor no less than thirty days after the event giving rise to the claim, and for claims related in any way to the Owner or Prime Contract, no less than seven days prior to the time in which the Contractor must provide notice of the claim to the Owner under the Prime Contract. Subcontractor's recovery of additional cost, time, or both cost and time for any claim attributable to the Owner shall be limited to the proportionate recovery by Contractor against Owner for such claim. Subcontractor will cooperate and assist Contractor in pursuing any claim by Contractor against Owner on behalf of Subcontractor. In the event that the pursuit of any claim by Contractor against Owner requires litigation, arbitration, or any alternate dispute resolution procedures, Subcontractor agrees to pay for a proportionate share of attorneys' fees, litigation, arbitration, and other resolution costs incurred by Contractor in pursuing the claim on behalf of Subcontractor, based upon the amount claimed by Subcontractor as compared to the total value of the claim pursued by the Contractor.

B. Except as provided by applicable lien, bond, or prompt payment laws, Subcontractor shall not make any claims against Owner for compensation or additional compensation for performance of the Subcontract Work.

12.02 *Dispute Resolution*

A. Either Contractor or Subcontractor may request mediation of any dispute between Contractor and Subcontractor in connection with this Subcontract that has not been settled to their mutual

satisfaction within the applicable notice or cure periods provided in this Subcontract, or that Contractor has not pursued against Owner as described above. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Subcontract Date. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to this Subcontract.

B. Contractor and Subcontractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

C. If the dispute is not resolved by mediation, each party to this Subcontract shall be barred from further action to assert its claim after 30 days after termination of the mediation unless, within that time period, Contractor or Subcontractor:

1. elects in writing to invoke any dispute resolution procedure expressly provided for in a Subcontract exhibit or elsewhere in the Subcontract Documents; or

2. agrees with the other party to submit the dispute to another dispute resolution process; or

3. gives written notice to the other party of the intent to submit the claim to a court of competent jurisdiction.

D. If Contractor is engaged in an arbitration with Owner that relates, in whole or in part, to a dispute between Contractor and Subcontractor, then Contractor shall have the sole and exclusive discretion to join Subcontractor as a party to the Contractor-Owner arbitration. Subcontractor consents to the jurisdiction of any such arbitration proceeding to which it is joined pursuant to this provision.

ARTICLE 13 – SUBCONTRACTOR'S REPRESENTATIONS

13.01 *Subcontractor's Representations*

In order to induce Contractor to enter into this Subcontract, Subcontractor makes the following representations:

A. Subcontractor has examined and carefully studied the Subcontract Documents, and any data and reference items identified in the Subcontract Documents, including but not limited to initial schedules identified by Contractor.

B. Subcontractor has visited the site, conducted a thorough, alert visual examination of the site and adjacent areas, and become familiar with and is satisfied as to the general, local, and site conditions that may affect cost, progress, and performance of the Subcontract Work.

C. Subcontractor is familiar with and is satisfied as to all laws and regulations that may affect cost, progress, and performance of the Subcontract Work.

D. Subcontractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the site and all drawings of physical conditions relating to existing surface or subsurface structures at the site that have been identified by the Prime Contract, especially with respect to technical data in such reports and drawings, and (2) reports and drawings of hazardous environmental

conditions, if any, at or adjacent to the site that have been identified in the Prime Contract, especially with respect to technical data in such reports and drawings.

E. Subcontractor has considered the information known to Subcontractor itself; information commonly known to contractors and subcontractors doing business in the locality of the site; information and observations obtained from visits to the site; the Subcontract Documents; and the site-related reports and drawings, if any, identified in the Prime Contract, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Subcontract Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Subcontractor; and (3) Subcontractor's safety precautions and programs.

F. Based on the information and observations referred to in the preceding paragraphs, Subcontractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Subcontract Work at the Subcontract Price, within the Subcontract Times, and in accordance with the other terms and conditions of the Subcontract.

G. Subcontractor is aware of the general nature of work to be performed by Owner, Contractor, other subcontractors, and others at the site that relates to the Subcontract Work as indicated in the Subcontract Documents.

H. Subcontractor has given Contractor written notice of all conflicts, errors, ambiguities, or discrepancies that Subcontractor has discovered in the Subcontract Documents, and the written resolution thereof by Contractor is acceptable to Subcontractor.

I. The Subcontract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Subcontract Work.

J. Subcontractor's entry into this Subcontract constitutes an incontrovertible representation by Subcontractor that without exception all prices in the Subcontract are premised upon performing and furnishing the Subcontract Work required by the Subcontract Documents.

ARTICLE 14 – SUBCONTRACT DOCUMENTS

14.01 *Subcontract Contents*

A. The Subcontract Documents consist of the following:

1. This Subcontract (pages 1 to __, inclusive).

2. Prime Contract, with the exception of confidential terms. The following portions of the Prime Contract are attached as Exhibit A:

a. General Conditions (pages ___ to ___, inclusive).

b. Supplementary Conditions (pages ___ to ___, inclusive).

c. Specifications, Division 01

d. ***[other Specification sections]*** ___ (pages ___ to ___, inclusive).

e. ***[Drawings; incorporate by reference if not attached]*** ___ (pages ___ to ___, inclusive).

f. ***[other Prime Contract items]***

3. ***[Subcontract scope of Subcontract Work exhibit]***

4. ***[Requirements for Subcontractor's insurance—limits, deductibles, special endorsements, etc.]***

5. Subcontract performance bond (pages ___ to ___, inclusive). ***[delete if not required]***

6. Subcontract payment bond (pages ___ to ___, inclusive). ***[delete if not required]***

7. Subcontractor's bid or proposal (pages ___ to ___, inclusive). ***[include as Subcontract Document only if necessary to avoid substantial rekeying of critical price or other information]***

8. Subcontract dispute resolution procedures ***[if any]***

9. Other exhibits to this Subcontract (enumerated as follows):

10. The following which may be delivered or issued on or after the Subcontract Date and are not attached hereto:

    a. Notice to Proceed

    b. Work Change Directives.

    c. Change Orders.

    d. Field Orders.

NOTE TO USER

Revise or supplement the list above to suit the specific needs of this Subcontract.

B. The documents listed in the paragraph above are attached to this Subcontract (except as expressly noted otherwise above).

C. There are no Subcontract Documents other than those listed above in this Article 14. The Subcontract supersedes prior negotiations, representations, and agreements regarding the Subcontract Work, whether written or oral.

D. The Subcontract Documents may only be amended, modified, or supplemented by written agreement of Contractor and Subcontractor.

ARTICLE 15 – MISCELLANEOUS

15.01 *Terms*

Terms used in this Subcontract will have the meanings stated here, or in the Prime Contract's General Conditions and Supplementary Conditions.

15.02 *Assignment of Subcontract*

No assignment by Subcontractor of any rights under or interests in the Subcontract will be binding on Contractor without Contractor's written consent; and, specifically but without limitation, payments that may become due and money that is due may not be assigned by Subcontractor 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 Subcontract Documents.

15.03 *Successors and Assigns*

Contractor and Subcontractor 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 Subcontract Documents.

15.04 *Severability*

Any provision or part of the Subcontract 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 Contractor and Subcontractor, which agree that the Subcontract 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.

15.05 *Subcontractor's Certifications*

A Subcontractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Subcontract. For the purposes of this paragraph:

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 Subcontract execution;

2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Subcontract to the detriment of Owner or Contractor, (b) to establish bid or Subcontract prices at artificial non-competitive levels, or (c) to deprive Owner or Contractor 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 or Contractor, 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 Subcontract.

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

NOTE TO USER

The Subcontract Date and the dates of any Subcontract performance bond and Subcontract payment bond should be the same, if possible. In no case should the date of any performance or payment bond be earlier than the Subcontract Date.

CONTRACTOR:

_____

By: _____

Title: _____

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

Attest: _____

Title: _____

Address for giving notices:

_____

_____

_____

SUBCONTRACTOR:

_____

By: _____

Title: _____

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

Attest: _____

Title: _____

Address for giving notices:

_____

_____

_____

License No.: _____

(Where applicable)

NOTE TO USER: Use in those states or other jurisdictions where applicable or required.

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EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

NOTICE TO PROCEED

Owner: Town of Apex	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer: The Wooten Company	Engineer's Project No.: 2519-CK
Project: Pleasant Park 1.5 MG Elevated Water Tank	Contract Name: N/A
	Effective Date of Contract:

TO CONTRACTOR:

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on [_____, 20__]. *[see Paragraph 4.01 of the General Conditions]*

On that date, Contractor shall start performing its obligations under the Contract Documents. No Work shall be done at the Site prior to such date. In accordance with the Agreement, the number of days to achieve Substantial Completion is 365, and the number of days to achieve readiness for final payment is 400.

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

Owner: Town of Apex

Authorized Signature

By: _____

Title: _____

Date Issued: _____

Copy: Engineer

Acceptance of Notice

Receipt of the Notice of Proceed is hereby acknowledged by _____

this the _____ day of _____, 20___.

By: _____

Title: _____

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EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

PERFORMANCE BOND

CONTRACTOR *(name and address)*:

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

OWNER *(name and address)*:
Town of Apex
73 Hunter Street
P.O. Box 250
Apex, NC 27502-0250

CONSTRUCTION CONTRACT
Effective Date of the Agreement:
Amount:
Description *(name and location)*: Pleasant Park 1.5 MG Elevated Water Tank, 1780 Kings View Trail, Apex 27502

BOND
Bond Number:
Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:
Amount:
Modifications to this Bond Form: ☐ None ☒ See Paragraph 16

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

CONTRACTOR AS PRINCIPAL	**SURETY**
_____ *(seal)*	_____ *(seal)*
Contractor's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	**By:** _____
Signature	Signature *(attach power of attorney)*
_____	_____
Print Name	Print Name
_____	_____
Title	Title
Attest: _____	**Attest:** _____
Signature	Signature
_____	_____
Title	Title

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

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after:

3.1 The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

3.2 The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

3.3 The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

7.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

7.2 additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and

7.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.

10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

11. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

14. Definitions

14.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

14.2 Construction Contract: The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

14.3 Contractor Default: Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

14.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

14.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.

15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

16. Modifications to this Bond are as follows:

The language of Paragraph 11 shall be deleted and replaced with the following:

11. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in Wake County, North Carolina within three (3) years after a declaration of Contractor Default or within three (3) years after the Contractor ceased working or within three (3) 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 period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

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EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

PAYMENT BOND

CONTRACTOR *(name and address)*:

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

OWNER *(name and address)*:
Town of Apex
73 Hunter Street
P.O. Box 250
Apex, NC 27502-0250

CONSTRUCTION CONTRACT
Effective Date of the Agreement:
Amount:
Description *(name and location)*: Pleasant Park 1.5 MG Elevated Water Tank, 1780 Kings View Trail, Apex 27502

BOND
Bond Number:
Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:
Amount:
Modifications to this Bond Form: ☐ None ☒ See Paragraph 18

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

CONTRACTOR AS PRINCIPAL

_____ *(seal)*
Contractor's Name and Corporate Seal

By: _____
Signature

_____
Print Name

_____
Title

Attest: _____
Signature

_____
Title

SURETY

_____ *(seal)*
Surety's Name and Corporate Seal

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

_____
Print Name

_____
Title

Attest: _____
Signature

_____
Title

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

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.

4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.

5. The Surety's obligations to a Claimant under this Bond shall arise after the following:

   5.1 Claimants who do not have a direct contract with the Contractor,

      5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and

      5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).

   5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).

6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.

7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

   7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

   7.2 Pay or arrange for payment of any undisputed amounts.

   7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

9. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.

11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. **Definitions**

16.1 **Claim:** A written statement by the Claimant including at a minimum:

1. The name of the Claimant;
2. The name of the person for whom the labor was done, or materials or equipment furnished;
3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
4. A brief description of the labor, materials, or equipment furnished;
5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
7. The total amount of previous payments received by the Claimant; and
8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2 **Claimant:** An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

16.3 **Construction Contract:** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

16.4 **Owner Default**: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

16.5 **Contract Documents:** All the documents that comprise the agreement between the Owner and Contractor.

17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

18. Modifications to this Bond are as follows:**The language of Paragraph 12 shall be deleted and replaced with the following:**

12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in Wake County, North Carolina or after the expiration of three (3) years from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2 or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

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SECTION 00 61 18

POWER OF ATTORNEY, PB AND PB

PAGE FOR ATTACHING

PERFORMANCE & PAYMENT BONDS

POWER OF ATTORNEY

END OF SECTION

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SECTION 00 62 16

CERTIFICATE OF INSURANCE

PAGE FOR ATTACHING

CERTIFICATE OF INSURANCE

END OF SECTION

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Contractor's Application for Payment No.

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

Application For Payment

Change Order Summary

Approved Change Orders		
Number	Additions	Deductions
TOTALS		
NET CHANGE BY CHANGE ORDERS		

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

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

By:	Date:

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

is recommended by: _____ _____
(Engineer) (Date)

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

is approved by: _____ _____
(Owner) (Date)

Approved by: _____ _____
Funding or Financing Entity (if applicable) (Date)

Progress Estimate - Lump Sum Work

Contractor's Application

For (Contract):	Application Number:
Application Period:	Application Date:

			Work Completed		E	F		G
A		B	C	D				
Specification Section No.	Description	Scheduled Value ($)	From Previous Application (C+D)	This Period	Materials Presently Stored (not in C or D)	Total Completed and Stored to Date (C + D + E)	% (F / B)	Balance to Finish (B - F)
	Totals							

MBE DOCUMENTATION FOR CONTRACT PAYMENTS

Prime Contractor/Architect: _____

Address & Phone: _____

Project Name: _____

Pay Application #: _____ Period: _____

The following is a list of payments to be made to minority business contractors on this project for the above-mentioned period.

Firm Name	***Minority Category**	**Payment Amount**	**Owner Use Only**

*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

Date: _____ Approved/Certified By: _____

Name

_____

Title

_____

Signature

****THIS DOCUMENT MUST BE SUBMITTED WITH EACH PAY REQUEST & FINAL PAYMENT****

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NORTH CAROLINA SALES TAX AND USE REPORT

(Paid During This Estimate Period)

PAGE ____ of ____

PROJECT _____ _____ COUNTY ESTIMATE NO. _____

CONTRACTOR _____ PERIOD ENDING _____

DATE	VENDOR NAME	INVOICE NUMBER	INVOICE AMOUNT	TYPE OF PROPERTY	STATE TAX	COUNTY TAX	TOTAL TAX	COUNTY OF SALE*

I certify that the above-listed vendors were paid sales tax upon purchase 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. No tax on purchases or rentals of supplies, tools and/or equipment is included in the above list. All of the material above became a part of or is annexed to the building(s) or structure(s) being erected, altered or repaired. I certify that, to the best of my knowledge, the information provided here is true, correct, and complete

Sworn to and subscribed to before me this _____ day of _____, 20____.

_____
Notary Public

My commission expires: _____

Seal

_____
Contractor's Signature

_____
Print or Type Name of Above

*If this is an out-of-state vendor, the County of Sale should be the county to which the merchandise was shipped.

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CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner: Town of Apex	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer: The Wooten Company	Engineer's Project No.: 2519-CK
Project: Pleasant Park 1.5 MG Elevated Water Tank	Contract Name:

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.

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 shall be as provided in the Contract, except as amended as follows: *[Note: 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.]*

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: *[punch list; others]*

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.

EXECUTED BY ENGINEER:	RECEIVED:	RECEIVED:
By: _____ (Authorized signature)	By: _____ Owner (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____

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NOTICE OF ACCEPTABILITY OF WORK

PROJECT: Pleasant Park 1.5 MG Elevated Water Tank

OWNER: Town of Apex

CONTRACTOR:

OWNER'S CONSTRUCTION CONTRACT IDENTIFICATION:

EFFECTIVE DATE OF THE CONSTRUCTION CONTRACT:

ENGINEER: The Wooten Company

NOTICE DATE:

To: _____
Owner

And To: _____
Contractor

From: _____
Engineer

The Engineer hereby gives notice to the above Owner and Contractor that Engineer has recommended final payment of Contractor, and that the Work furnished and performed by Contractor under the above Construction Contract is acceptable, expressly subject to the provisions of the related Contract Documents, the Agreement between Owner and Engineer for Professional Services dated _____, and the following terms and conditions of this Notice:

CONDITIONS OF NOTICE OF ACCEPTABILITY OF WORK

The Notice of Acceptability of Work ("Notice") is expressly made subject to the following terms and conditions to which all those who receive said Notice and rely thereon agree:

1. This Notice is given with the skill and care ordinarily used by members of the engineering profession practicing under similar conditions at the same time and in the same locality.

2. This Notice reflects and is an expression of the Engineer's professional opinion.

3. This Notice is given as to the best of Engineer's knowledge, information, and belief as of the Notice Date.

4. This Notice is based entirely on and expressly limited by the scope of services Engineer has been employed by Owner to perform or furnish during construction of the Project (including observation of the Contractor's work) under Engineer's Agreement with Owner, and applies only to facts that are within Engineer's knowledge or could reasonably have been ascertained by Engineer as a result of carrying out the responsibilities specifically assigned to Engineer under such Agreement.

5. This Notice is not a guarantee or warranty of Contractor's performance under the Construction Contract, an acceptance of Work that is not in accordance with the related Contract Documents, including but not limited to defective Work discovered after final inspection, nor an assumption of responsibility for any failure of Contractor to furnish and perform the Work thereunder in accordance with the Construction Contract Documents, or to otherwise comply with the Construction Contract Documents or the terms of any special guarantees specified therein.

6. This Notice does not relieve Contractor of any surviving obligations under the Construction Contract, and is subject to Owner's reservations of rights with respect to completion and final payment.

7.

By: _____

Title: _____

Dated: _____

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

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

EJCDC®
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

Issued and Published Jointly by

ACEC
AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

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CSI NUCA
REPRESENTING UTILITY & EXCAVATION CONTRACTORS

These General Conditions have been prepared for use with the Agreement Between Owner and Contractor for Construction Contract (EJCDC® C-520, Stipulated Sum, or C-525, Cost-Plus, 2013 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other.

To prepare supplementary conditions that are coordinated with the General Conditions, use EJCDC's Guide to the Preparation of Supplementary Conditions (EJCDC® C-800, 2013 Edition). The full EJCDC Construction series of documents is discussed in the Commentary on the 2013 EJCDC Construction Documents (EJCDC® C-001, 2013 Edition).

National Society of Professional Engineers

1420 King Street, Alexandria, VA 22314-2794

(703) 684-2882

www.nspe.org

American Council of Engineering Companies

1015 15th Street N.W., Washington, DC 20005

(202) 347-7474

www.acec.org

American Society of Civil Engineers

1801 Alexander Bell Drive, Reston, VA 20191-4400

(800) 548-2723

www.asce.org

NOTE: EJCDC publications may be purchased at www.ejcdc.org, or from any of the sponsoring organizations above.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

TABLE OF CONTENTS

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.

2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.

3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

5. *Bidder*—An individual or entity that submits a Bid to Owner.

6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.

7. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.

8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.

9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.

10. *Claim*—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract; or (b) a demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer

has declined to address. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. ("CERCLA"); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5101 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. ("RCRA"); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.

12. *Contract*—The entire and integrated written contract between the Owner and Contractor concerning the Work.

13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.

14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents. .

15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.

16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.

17. *Cost of the Work*—See Paragraph 13.01 for definition.

18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.

19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.

20. *Engineer*—The individual or entity named as such in the Agreement.

21. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.

22. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.

23. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

24. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.

25. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date or by a time prior to Substantial Completion of all the Work.

26. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.

27. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.

28. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.

29. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.

30. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.

32. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or "RPR" includes any assistants or field staff of Resident Project Representative.

33. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.

34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals and the performance of related construction activities.

35. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

36. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.

37. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands furnished by Owner which are designated for the use of Contractor.

38. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.

39. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.

40. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.

42. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.

43. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.

44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.

45. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

46. *Unit Price Work*—Work to be paid for on the basis of unit prices.

47. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

48. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 *Terminology*

A. The words and terms discussed in the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives*:

1. The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.

C. *Day*:

1. The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective*:

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

a. does not conform to the Contract Documents; or

b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or

c. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or 15.04).

E. *Furnish, Install, Perform, Provide*:

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

A. *Bonds*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.

B. *Evidence of Contractor’s Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.

C. *Evidence of Owner’s Insurance*: After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.

B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise specifically required by the Contract Documents), Contractor shall submit to Engineer for timely review:

1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

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 *Initial Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.

2.06 *Electronic Transmittals*

A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.

B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.

C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the recipient's use of software application packages, operating systems, or

computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one is as binding as if required by all.

B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents.

C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall govern.

D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.

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

3.02 *Reference Standards*

A. Standards Specifications, Codes, Laws and Regulations

1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard specification, manual, reference standard, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*:

1. *Contractor's Verification of Figures and Field Measurements*: Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict,

error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.

2. *Contractor's Review of Contract Documents*: If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies*:

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:

a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or

b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

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

B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.

C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly give written notice to Owner and Contractor that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

A. Contractor and its Subcontractors and Suppliers shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or

2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.

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

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

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

4.02 *Starting the Work*

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

4.03 *Reference Points*

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

4.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 11.

B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

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

B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.

C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:

1. severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;

2. abnormal weather conditions;

3. acts or failures to act of utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and

4. acts of war or terrorism.

D. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5.

E. Paragraph 8.03 governs delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor.

G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

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

5.01 *Availability of Lands*

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

B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

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

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.

2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.12, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or at law; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part

by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

B. *Removal of Debris During Performance of the Work*: During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

C. *Cleaning*: Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

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

5.03 *Subsurface and Physical Conditions*

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

1. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;

2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); and

3. Technical Data contained in such reports and drawings.

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

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

A. *Notice by Contractor*: If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site either:

1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or

2. is of such a nature as to require a change in the Drawings or Specifications; or

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. 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 the necessity of Owner's obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.

C. *Owner's Statement to Contractor Regarding Site Condition*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.

D. *Possible Price and Times Adjustments*:

1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. such condition must fall within any one or more of the categories described in Paragraph 5.04.A;

b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,

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

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:

a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise; or

b. the existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or

c. Contractor failed to give the written notice as required by Paragraph 5.04.A.

3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.

4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

5.05 *Underground Facilities*

A. *Contractor's Responsibilities*: The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and

2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:

a. reviewing and checking all information and data regarding existing Underground Facilities at the Site;

b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;

c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and

d. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.

B. *Notice by Contractor*: If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then Contractor shall, promptly after

becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.

C. *Engineer's Review*: Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and recommendations. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

D. *Owner's Statement to Contractor Regarding Underground Facility*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question, addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.

E. *Possible Price and Times Adjustments*:

1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, or any related 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. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;

    b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;

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

    d. Contractor gave the notice required in Paragraph 5.05.B.

2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.

3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 *Hazardous Environmental Conditions at Site*

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

1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and

2. Technical Data contained in such reports and drawings.

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

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.

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

D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.

E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.

G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off.

H. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

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

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

K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6 – BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of all of Contractor's obligations under the Contract. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.

B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.

D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.

E. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.

F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

6.02 *Insurance—General Provisions*

A. Owner and Contractor shall obtain and maintain insurance as required in this Article and in the Supplementary Conditions.

B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.

C. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is

maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

E. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.

F. If either party does not purchase or maintain all of the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.

G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.

H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price shall be adjusted accordingly.

I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.

J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 *Contractor's Insurance*

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

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.

2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).

3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).

4. Foreign voluntary worker compensation (if applicable).

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

1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.

2. claims for damages insured by reasonably available personal injury liability coverage.

3. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.

C. *Commercial General Liability—Form and Content*: Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:

1. Products and completed operations coverage:

a. Such insurance shall be maintained for three years after final payment.

b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.

2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.

3. Broad form property damage coverage.

4. Severability of interest.

5. Underground, explosion, and collapse coverage.

6. Personal injury coverage.

7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.

8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.

D. *Automobile liability*: Contractor shall purchase and maintain automobile liability insurance against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.

E. *Umbrella or excess liability*: Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.

F. *Contractor's pollution liability insurance*: Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result

of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.

G. *Additional insureds*: The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.

H. *Contractor's professional liability insurance*: If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.

I. *General provisions*: The policies of insurance required by this Paragraph 6.03 shall:

1. include at least the specific coverages provided in this Article.

2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.

3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.

4. remain in effect at least until final payment (and longer if expressly required in this Article) and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract Documents.

5. be appropriate for the Work being performed and provide protection from claims that may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable.

J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

6.04 *Owner's Liability Insurance*

A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

B. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

6.05 *Property Insurance*

A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the full insurable replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."

2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.

3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.

4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).

5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).

6. extend to cover damage or loss to insured property while in transit.

7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.

8. allow for the waiver of the insurer's subrogation rights, as set forth below.

9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.

10. not include a co-insurance clause.

11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.

12. include performance/hot testing and start-up.

13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.

B. *Notice of Cancellation or Change*: All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured.

C. *Deductibles*: The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.

D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.

E. *Additional Insurance*: If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.05, it may do so at Contractor's expense.

F. *Insurance of Other Property*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

6.06 *Waiver of Rights*

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

B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06.

C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.

D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 will be adjusted and settled with the named insured that purchased the

policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.05 shall distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.

C. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.01 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.

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

7.02 *Labor; Working Hours*

A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during 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. No lane closures will be permitted during weekend construction.

7.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.

B. All materials and equipment incorporated into the Work shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and

guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.04 *"Or Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment, or items from other proposed suppliers under the circumstances described below.

1. If Engineer in its sole discretion determines that an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer shall deem it an "or equal" item. For the purposes of this paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment Engineer determines that:

1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;

3) it has a proven record of performance and availability of responsive service; and

4) it is not objectionable to Owner.

b. Contractor certifies that, if approved and incorporated into the Work:

1) there will be no increase in cost to the Owner or increase in Contract Times; and

2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

B. *Contractor's Expense*: Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.

C. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal", which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.

D. *Effect of Engineer's Determination*: Neither approval nor denial of an "or-equal" request shall result in any change in Contract Price. The Engineer's denial of an "or-equal" request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.

E. *Treatment as a Substitution Request*: If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer considered the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 *Substitutes*

A. Unless the specification or description of an item of material or equipment required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment under the circumstances described below. To the extent possible such requests shall be made before commencement of related construction at the Site.

1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of material or equipment from anyone other than Contractor.

2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

3. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:

a. shall certify that the proposed substitute item will:

1) perform adequately the functions and achieve the results called for by the general design,

2) be similar in substance to that specified, and

3) be suited to the same use as that specified.

b. will state:

1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times,

2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and

3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.

c. will identify:

1) all variations of the proposed substitute item from that specified, and

2) available engineering, sales, maintenance, repair, and replacement services.

d. shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.

B. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.

C. *Special Guarantee*: Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

D. *Reimbursement of Engineer's Cost*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

E. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.

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

7.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.

B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract to do so.

C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against which Contractor has reasonable objection.

D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable, during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within five days.

E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors, Suppliers, or other individuals or entities for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.

F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.

G. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

H. On a monthly basis Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.

I. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions.

J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.

K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.

L. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.

N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.

O. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier, or other individual or entity; nor

2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

7.07 *Patent Fees and Royalties*

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

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

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

7.08 *Permits*

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

7.09 *Taxes*

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

7.10 *Laws and Regulations*

A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

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

7.11 *Record Documents*

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

7.12 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:

1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.

C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.

D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

G. Contractor's duties and responsibilities for safety and protection shall resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.13 *Safety Representative*

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

7.14 *Hazard Communication Programs*

A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or

exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.15 *Emergencies*

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

7.16 *Shop Drawings, Samples, and Other Submittals*

A. *Shop Drawing and Sample Submittal Requirements*:

1. Before submitting a Shop Drawing or Sample, Contractor shall have:

a. reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

c. determined and verified the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that submittal, and that Contractor approves the submittal.

3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.

B. *Submittal Procedures for Shop Drawings and Samples*: Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.

1. *Shop Drawings*:

a. Contractor shall submit the number of copies required in the Specifications.

b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to

provide and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.D.

2. *Samples*:

   a. Contractor shall submit the number of Samples required in the Specifications.

   b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 7.16.D.

3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Other Submittals*: Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.

D. *Engineer's Review*:

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto.

3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

4. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order.

5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 7.16.A and B.

6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, shall not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.

7. Neither Engineer's receipt, review, acceptance or approval of a Shop Drawing, Sample, or other submittal shall result in such item becoming a Contract Document.

8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.D.4.

E. *Resubmittal Procedures*:

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

2. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.

3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

7.17 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.

B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or

2. normal wear and tear under normal usage.

C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

1. observations by Engineer;

2. recommendation by Engineer or payment by Owner of any progress or final payment;

3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;

4. use or occupancy of the Work or any part thereof by Owner;

5. any review and approval of a Shop Drawing or Sample submittal;

6. the issuance of a notice of acceptability by Engineer;

7. any inspection, test, or approval by others; or

8. any correction of defective Work by Owner.

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

7.18 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.

B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

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

7.19 *Delegation of Professional Design Services*

A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable Laws and Regulations.

B. If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, and other submittals prepared by such professional. Shop

Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this paragraph, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 7.16.D.1.

E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

ARTICLE 8 – OTHER WORK AT THE SITE

8.01 *Other Work*

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

B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any utility work at or adjacent to the Site, Owner shall provide such information to Contractor.

C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.

D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

8.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:

1. the identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;

2. an itemization of the specific matters to be covered by such authority and responsibility; and

3. the extent of such authority and responsibilities.

B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

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

B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due to Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this paragraph.

C. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due to Contractor.

D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9 – OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

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

9.02 *Replacement of Engineer*

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

9.03 *Furnish Data*

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

9.04 *Pay When Due*

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

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

A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.

B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.

C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

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

9.07 *Change Orders*

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

9.08 *Inspections, Tests, and Approvals*

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

9.09 *Limitations on Owner's Responsibilities*

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

9.10 *Undisclosed Hazardous Environmental Condition*

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

9.11 *Evidence of Financial Arrangements*

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

9.12 *Safety Programs*

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

B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

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

10.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.08. Particularly, but without limitation, during

or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Project Representative*

A. 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 Paragraph 10.08. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

10.04 *Rejecting Defective Work*

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

10.05 *Shop Drawings, Change Orders and Payments*

A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.

B. Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, are set forth in Paragraph 7.19.

C. Engineer's authority as to Change Orders is set forth in Article 11.

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

10.06 *Determinations for Unit Price Work*

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

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

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

10.08 *Limitations on Engineer's Authority and Responsibilities*

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

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

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

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

E. The limitations upon authority and responsibility set forth in this Paragraph 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *Compliance with Safety Program*

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

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

11.01 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.

1. *Change Orders*:

a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.

b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.

2. *Work Change Directives*: A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an

adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.

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

11.02 *Owner-Authorized Changes in the Work*

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

11.03 *Unauthorized Changes in the Work*

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

11.04 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall comply with the provisions of Article 12.

B. An adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on

the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.04.C).

C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

a. for costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee shall be 15 percent;

b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.04.C.2.a and 11.04.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of five percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted work the maximum total fee to be paid by Owner shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;

d. no fee shall be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;

e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.

B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *Change Proposals*

A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under

the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.

1. *Procedures*: Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.

2. *Engineer's Action*: Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

3. *Binding Decision*: Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.

B. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

11.07 *Execution of Change Orders*

A. Owner and Contractor shall execute appropriate Change Orders covering:

1. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;

2. changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;

3. changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.02, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and

4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.

B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 *Notification to Surety*

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

ARTICLE 12 – CLAIMS

12.01 *Claims*

A. *Claims Process*: The following disputes between Owner and Contractor shall be submitted to the Claims process set forth in this Article:

1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;

2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and

3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters.

B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party, with a copy to Engineer.

D. *Mediation*:

1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate shall stay the Claim submittal and response process.

2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim

submittal and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.

3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.

E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action shall be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.

F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.

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

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

13.01 *Cost of the Work*

A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:

1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

2. To determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.

B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall include only the following items:

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, and vacation and holiday pay applicable

thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

    a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

    b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

    c. Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

    d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.

    e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

    f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 6.05), provided such losses and damages have resulted from causes

other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

C. *Costs Excluded*: The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.

2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee*: When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.

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

13.02 *Allowances*

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances*: Contractor agrees that:

1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. *Contingency Allowance*: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

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

13.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of the following paragraph.

E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;

2. there is no corresponding adjustment with respect to any other item of Work; and

3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

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

14.01 *Access to Work*

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

14.02 *Tests, Inspections, and Approvals*

A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.

B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:

1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;

2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;

3. by manufacturers of equipment furnished under the Contract Documents;

4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and

5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

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

E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.

F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to

cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

A. *Contractor's Obligation*: It is Contractor's obligation to assure that the Work is not defective.

B. *Engineer's Authority*: Engineer has the authority to determine whether Work is defective, and to reject defective Work.

C. *Notice of Defects*: Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.

D. *Correction, or Removal and Replacement*: Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.

E. *Preservation of Warranties*: When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

F. *Costs and Damages*: In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

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

14.05 *Uncovering Work*

A. Engineer has the authority to require 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, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

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

14.07 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.

C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will

include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

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

15.01 *Progress Payments*

A. *Basis for Progress Payments*: The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.

B. *Applications for Payments*:

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. *Review of Applications*:

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

a. the Work has progressed to the point indicated;

b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and

c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or

b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

a. to supervise, direct, or control the Work, or

b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or

d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, or

e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.

6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:

a. the Work is defective, requiring correction or replacement;

b. the Contract Price has been reduced by Change Orders;

c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due*:

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

E. *Reductions in Payment by Owner*:

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:

a. claims have been made against Owner on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;

c. Contractor has failed to provide and maintain required bonds or insurance;

d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;

e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;

f. the Work is defective, requiring correction or replacement;

g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

h. the Contract Price has been reduced by Change Orders;

i. an event that would constitute a default by Contractor and therefore justify a termination for cause has occurred;

j. liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;

k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

l. there are other items entitling Owner to a set off against the amount recommended.

2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount

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

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

15.02 *Contractor's Warranty of Title*

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

15.03 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer 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 shall fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.

F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. At any time Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through E for that part of the Work.

2. At any time Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.05 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

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

15.06 *Final Payment*

A. *Application for Payment*:

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of

inspection, annotated record documents (as provided in Paragraph 7.11), and other documents, Contractor may make application for final payment.

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

   a. all documentation called for in the Contract Documents;

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

   c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

   d. a list of all disputes that Contractor believes are unsettled; and

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

3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

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

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

C. *Completion of Work*: The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.

D. *Payment Becomes Due*: Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation,

including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.

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

15.08 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. correct the defective repairs to the Site or such other adjacent areas;

2. correct such defective Work;

3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and

4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

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

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

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

16.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule);

2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;

3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or

4. Contractor's repeated disregard of the authority of Owner or Engineer.

B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:

1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and

2. enforce the rights available to Owner under any applicable performance bond.

C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.

D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.

E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses,

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

F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.

G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate For Convenience*

A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and

3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.

B. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.

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

expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

A. *Disputes Subject to Final Resolution*: The following disputed matters are subject to final resolution under the provisions of this Article:

1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and

2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising after final payment has been made.

B. *Final Resolution of Disputes*: For any dispute subject to resolution under this Article, Owner or Contractor may:

1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or

2. agree with the other party to submit the dispute to another dispute resolution process; or

3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18 – MISCELLANEOUS

18.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

18.02 *Computation of Times*

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

18.03 *Cumulative Remedies*

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

18.04 *Limitation of Damages*

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

18.05 *No Waiver*

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

18.06 *Survival of Obligations*

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

18.07 *Controlling Law*

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

18.08 *Headings*

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

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TABLE OF CONTENTS

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

SC-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 EJCDC No. C-620. Contractor may use their standard computerized forms for providing detail payment breakdown as an attachment to summary sheet. Owner must approve all Applications for Payment before payment is made.

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 EJCDC No. C-941. Owner approval is required before Change Orders are effective.

SC-1.01.A.10. Delete paragraph 1.01.A.10 in its entirety and insert the following in its place:

Claim – A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both as provided for under the terms of this Agreement. A demand for money or services by a third party is not a claim.

SC-1.01.A.20. Add the following language to the end of Paragraph 1.01.A.20:

The Engineer's Consultants on this project are: None

A. Include the following definitions:

SC-1.01. Add to the list of definitions in Paragraph 1.01.A by inserting the following as numbered items in their proper alphabetical positions:

Geotechnical Baseline Report (GBR) — The interpretive report prepared by or for Owner regarding subsurface conditions at the Site, and containing specific baseline geotechnical conditions that may be anticipated or relied upon for bidding and contract administration purposes, subject to the controlling provisions of the Contract, including the GBR's own terms. The GBR is a Contract Document.

Geotechnical Data Report (GDR) — The factual report that collects and presents data regarding actual subsurface conditions at or adjacent to the Site, including Technical Data and other geotechnical data, prepared by or for Owner in support of the Geotechnical Baseline Report. The GDR's content may include logs of borings, trenches, and other site investigations, recorded measurements of subsurface water levels, the results of field and laboratory testing, and descriptions of the investigative and testing programs. The GDR does not include an interpretation of the data. If opinions, or interpretive or speculative non-factual comments or statements appear in a document that is labeled a GDR, such opinions, comments, or statements are not operative parts of the GDR and do not have contractual standing. Subject to that exception, the GDR is a Contract Document.

Minority Business — A business 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

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.

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.

Socially and Economically Disadvantaged Individual — defined the 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."

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.

Regular Working Hours — Regular working hours for the project are defined as 7:00 am to 7:00 pm, Eastern Standard Time. If work outside regular working hours on Saturday, Sunday, or legal holidays is needed, owners written consent will be required and working hours shall be between 9:00 am to 7:00 pm. Additionally, approved working days outside of regular working days specified above, shall not include lane closures for the completion of the weekend work.

ARTICLE 2 – PRELIMINARY MATTERS

SC-2.01 Delivery of Bonds and Evidence of Insurance

SC-2.01 **Delete Paragraphs 2.01 B. and C. in their entirety and insert the following in their place:**

B. Evidence of Contractor's Insurance: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner copies of the policies of insurance (including all endorsements, and identification of applicable self-insured retentions and deductibles) required to be provided by Contractor in Article 6. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

C. Evidence of Owner's Insurance: After receipt from Contractor of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor copies of the policies of insurance to be provided by Owner under Article 6 (if any). Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

SC-2.02 Copies of Documents

SC-2.02.A Delete Paragraph 2.02.A in its entirety and insert the following paragraph in its place:

A. Owner shall furnish to Contractor [4] copies of conformed Contract Documents incorporating and integrating all Addenda and any amendments negotiated prior to the Effective Date of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies of the conformed Contract Documents will be furnished upon request at the cost of reproduction.

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

SC-4.01 Commencement of Contract Times; Notice to Proceed

SC-4.01.A Paragraph 4.01.A is hereby deleted in its entirety and replaced as follows:

A. The Contract Times will commence to run on the day indicated in the Notice to Proceed. A Notice to Proceed will be issued at any time within 30 days after the Effective Date of the Agreement or a date agreed to by the Owner and Contractor.

SC-4.05 Delays in Contractor's Progress

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

H. Time extension for weather delays due to rain shall only be considered for above average precipitation. NOAA Report No. 20 shall be used to determine the average number of days with precipitation greater than or equal to 0.10 inch for each month. A link to this report is as follows: http://cdo.ncdc.noaa.gov/climatenormals/clim20/state-pdf/nc.pdf .

I. Claims for additional Contract Time for delays beyond the Contractor's control shall be submitted with the Contractor's monthly pay request in accordance with Article 10 of the General Conditions. Submittal shall include the number of days requested and the reason for the delay. Engineer shall notify the Owner and Contractor of his decision in accordance with Article 10 of the General Conditions. Approval of time shall be indicated by a Change Order.

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

SC-5.01 Availability of Lands

SC-5.01.B Paragraph 5.01.B is hereby deleted in its entirety and replaced as follows:

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.

SC-5.02 Use of Site and Other Areas

SC-5.02.A.2 Paragraph 5.02.A.2 is hereby amended to add "Owner's elected officials" to the list of parties to be indemnified and held harmless.

SC-5.03 Subsurface and Physical Conditions

SC-5.03 Add the following new subparagraphs C and D immediately after Paragraph 5.03.B:

C. The following reports of explorations and tests of subsurface conditions at or adjacent to the Site are known to Owner:

1. Geotechnical Report

D. The following drawings of physical conditions relating to existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities) are known to Owner:

1. N/A

SC-5.05 Underground Facilities

SC-5.05.A. The following subparagraphs A.3 through A.7 shall be added after Paragraph 5.05.A.2 as follows:

A.3 Contractor shall follow the North Carolina General Statutes, Chapter 87, Article 8, Underground Damage Prevention.

A.4 Contractor shall notify owners of underground facilities prior to start of Work.

A.5 Contractor shall investigate ahead of the Work to verify the existence of Underground Facilities.

A.6 Contractor assumes risks associated with, and shall repair damage to, Underground Facilities caused by the Work whether indicated or not in the Contract Documents. Repairs to Underground Facilities shall be done to the satisfaction of the Underground Facility owner and may require material and methods, which are better than the existing Facility. The Owner reserves the right to repair damage caused by the Contractor to its underground Facilities. If the Owner exercises this right, the Owner's cost of this Work shall be deducted from the money due the Contractor.

A.7 Contractor shall uncover Underground Facilities, with that owner's approval, that are located within the Work as necessary for Engineer to determine the requirements for the change in the work.

SC-5.06 Hazardous Environmental Conditions

SC-5.06.A. Add the following new subparagraphs immediately after Paragraph 5.06.A.2:

A.3 The following reports regarding Hazardous Environmental Conditions at the Site are known to Owner:

a. None

A.4 The following drawings regarding Hazardous Environmental Conditions at the Site are known to Owner:

a. None

SC-5.06.B "elected officials" is hereby added to the list of entities the Contractor may not make any claim against with respect to reliance on the documents outlined in subsections 1, 2, and 3.

SC-5.06.I Delete the content of paragraph 5.06.I in its entirety and replace with "Intentionally Deleted."

SC-5.07 Add the following paragraph 5.07 immediately after paragraph 5.06:

5.07 *Video Inspection of Pre-Construction Site Conditions*

A. The Contractor shall perform video inspections and take photographs of the proposed construction areas before disturbing the site in order to establish an accurate record of the pre-construction conditions for comparison to the final work. The Contractor shall provide the Owner

with copies of all video and photographic records at the appropriate times (i.e., pre-construction and post-construction). The cost of video and photographic work shall be incidental to the contract and no separate payment will be made by the Owner.

ARTICLE 6 – BONDS AND INSURANCE

SC-6.01 Performance, Payment, and Other Bonds

6.01.G. Add the new paragraph 6.01.G. immediately after Paragraph 6.01.F:

G. If requested by the Owner, a Performance and Indemnity Bond shall be posted with the N.C. Division of Highways in the amount as required in the Project Encroachment Contract which shall be provided by the Owner to the Contractor.

SC-6.02 Insurance—General Provisions

6.02 The content of Section 6.02 is hereby deleted in its entirety and replaced as follows:

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 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.

Notwithstanding the foregoing, Contractor may obtain worker's compensation insurance from an insurance company that has not been rated by A.M. Best, provided that such company (a) is domiciled in the state in which the project is located, (b) is certified or authorized as a worker's compensation insurance provider by the appropriate state agency, and (c) has been accepted to provide worker's compensation insurance for similar projects by the state within the last 12 months.

C. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or

elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision. Contractor shall provide certificates of insurance naming the Town of Apex as an additional insured by endorsement to the policies. Contractor shall provide notice of cancellation, non-renewal or material change in coverage to the Town of Apex within 10 days of their receipt of notice from the insurance company. Notwithstanding the foregoing or anything else in this Article, neither the requirement of the Contractor to have sufficient insurance nor the requirement that the Town be named an additional insured, shall constitute waiver of the Town's governmental immunity in any respect, under North Carolina law.

E. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.

F. If either party does not purchase or maintain all of the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.

G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.

H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price shall be adjusted accordingly.

I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.

J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

SC-6.03 Contractor's Insurance

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

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

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

State:		**Statutory – Per NC Worker's Compensation Laws**
Federal, if applicable (e.g., Longshoreman's):		**Statutory**
Jones Act coverage, if applicable:		
Bodily injury by accident, each accident	**$**	
Bodily injury by disease, aggregate	**$**	
Employer's Liability:		
Bodily injury, each accident	**$**	**1,000,000**
Bodily injury by disease, each employee	**$**	**1,000,000**
Bodily injury/disease aggregate	**$**	**1,000,000**
For work performed in monopolistic states, stop-gap liability coverage shall be endorsed to either the worker's compensation or commercial general liability policy with a minimum limit of:	**$**	**N/A**
Foreign voluntary worker compensation		**Statutory**

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

General Aggregate	**$**	**4,000,000**
Products - Completed Operations Aggregate	**$**	**2,000,000**
Personal and Advertising Injury	**$**	**1,000,000**
Each Occurrence (Bodily Injury and Property Damage)	**$**	**2,000,000**

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

Bodily Injury:		
Each person	**$**	**2,000,000**
Each accident	**$**	**2,000,000**
Property Damage:		

Each accident **$ 1,000,000**

[or]

Combined Single Limit of **$ 2,000,000**

4. Excess or Umbrella Liability:

Per Occurrence **$ 5,000,000**

General Aggregate **$ 5,000,000**

5. Contractor's Pollution Liability:

Each Occurrence **$ 2,000,000**

General Aggregate **$ 4,000,000**

☐ **Notwithstanding subsection F of this Section 6.03, if box is checked, Contractor is not required to provide Contractor's Pollution Liability insurance under this Contract**

6. Additional Insureds: In addition to Owner and Engineer, include as additional insureds the following: None

7. Contractor's Professional Liability (if applicable):

Each Claim **$ 2,000,000**

Annual Aggregate **$ 2,000,000**

8. Owner and Engineer shall be named additional insured by endorsements to the General Liability and Automobile Liability policies.

9. The Contractor shall ensure that any subcontractors carry worker's compensation insurance in the statutory minimum amounts, employer's liability insurance ($1,000,000 minimum), commercial general liability insurance ($1,000,000 minimum), and commercial automobile liability insurance ($2,000,000 minimum). Contractor shall ensure that subcontractor's name the Owner as an additional insured by endorsement to the policies.

SC-6.05 Property Insurance

SC-6.05.A.1 Delete Paragraph 6.05.A.1 and replace as follows:

1. include the Owner, Engineer, and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."

SC-6.05.A. Add the following subparagraphs 14-18 to Paragraph 6.05.A, as numbered items shown below:

14. be subject to a deductible amount of no more than $25,000 for direct physical loss in any one occurrence.

15. include for the benefit of Owner soft cost coverage including, without limitation, fixed expenses and debt service for a minimum of 12 months with a maximum deductible of 30 days, plus attorneys fees and engineering or other consultants' fees, if not otherwise covered;

16. 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. *[here list specific items of equipment and purchase value] - None*

b. *[here list items of material and purchase value] - None*

17. include by express endorsement coverage of damage to Contractor's equipment.

18. name Owner as loss payee by endorsement to the policy.

SC-6.05.A. Add the following language to Paragraph 6.05.A following subparagraph 6.05.A.18:

Notwithstanding anything to the contrary in this Paragraph 6.05.A, if requested by the Owner, or if agreed to by Owner upon Contractor's request, rather than providing the above referenced Builder's Risk insurance, Contractor may provide and maintain installation floater insurance for property under the care, custody, or control of Contractor. The installation floater insurance shall be a broad form or "all risk" policy providing coverage for all materials, supplies, machinery, fixtures, and equipment that will be incorporated into the Work. Coverage under the Contractor's installation floater will include:

1. any loss to property while in transit,

2. any loss at the Site, and

3. any loss while in storage, both on-site and off-site.

Coverage cannot be contingent on an external cause or risk, or limited to property for which the Contractor is legally liable. The Contractor will be solely responsible for any deductible carried under this coverage and claims on materials, supplies, machinery, fixture, and equipment that will be incorporated into the Work while in transit or in storage. This policy will include a waiver of subrogation applicable to Owner, Contractor, Engineer, all Subcontractors, and the officers, elected officials, directors, partners, employees, agents and other consultants and subcontractors of any of them. The Owner shall be named as an insured in the policy.

SC 6.05. Add the following subparagraph 6.05.G after subparagraph 6.05.F.

6.05.G. Insurance policies provided under 6.05 shall include flood insurance acceptable to Owner for all Work below 100-year flood elevation as reported by FEMA.

SC-6.06 Waiver of Rights

SC 6.06.B.1 Delete subparagraph 6.06.B.1 in its entirety and relabel subparagraph 6.06.B.2 as subparagraph 6.06.B.1.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

SC-7.02 Labor; Working Hours

SC-7.02.B. Add the following new subparagraphs (1) and (2) to Paragraph 7.02.B:

1. **Regular working hours will be 7:00 a.m. through 7:00 p.m**
2. **Owner's legal holidays are New Year's Day, Martin Luther King, Jr. Day, Good Friday, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving, Day after Thanksgiving, Christmas Eve, Christmas Day, and the Day after Christmas.**
3. **Contractor will not perform, and the Owner will not be expected to consent to, work during hours that would violate the Town of Apex Code of Ordinances. Work outside of regular working days on Saturday, Sunday, or legal holidays is needed with Owner's written consent. Working hours outside of regular working days is limited to 9:00 am to 7:00 pm. No lane closures will be permitted outside of regular working days and hours.**

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

Contractor shall be responsible for the cost of any overtime pay or other expense incurred by the Owner for Engineer's services (including those of the Resident Project Representative, if any), Owner's representative, and construction observation services, occasioned by the performance of Work on Saturday, Sunday, any legal holiday, or as overtime on any regular work day. If Contractor is responsible but does not pay, or if the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under Article 15.

1. **For purposes of administering the foregoing requirement, additional overtime costs are defined as 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 Engineer five (5) working days prior to the scheduled work. Contractor shall pay for overtime work at a minimum rate of $75 / hour.**
2. **The above will not prevent the Contractor from working outside the above time that 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 obtain approval of Work to be performed outside of the above work hours.**
3. **Contractor shall not be charged for inspector's time for Work specifically identified by the Contract Documents to be performed outside the above Work time or on weekends.**

SC-7.06.D. Add the following subparagraphs (1) and (2) to Paragraph 7.06.D:

1. Bidder shall indicate Minority Business Participation on the attachment to the Bid Forms. Low Bidder shall be required to submit the following Affidavits as attached to the end of this section:

a. Affidavit C, Portion of the Work to be Performed by Minority Firms.

b. Affidavit D, Good Faith Efforts

2. 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; or

b. With the approval of the awarding authority for good cause shown by the Contractor.

SC-7.06.P. Add the following new paragraph immediately after Paragraph 7.06.O:

P. The Contractor shall not award work valued at more than fifty percent (50%) of the Contract Price to Subcontractor(s), without prior written approval of the Owner.

SC-7.07.B Delete Paragraph 7.07.B and 7.07.C in their entirety and replace with paragraph 7.07.B as follows:

B. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, elected officials, 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 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.

SC-7.08.B. Add the following new paragraph 7.08.B immediately after Paragraph 7.08.A:

B. The Owner shall obtain and pay for the following permits:

1. NCDEQ Public Water Supply (Water Storage Tanks)

This permit is made part of this Contract and attached to the end of this Section. This paragraph does not relieve Contractor of his responsibility to comply with applicable Laws and Regulations as stated in Paragraph 7.10.C.

SC-7.10.C Add the following new paragraphs D through H immediately after Paragraph 7.10.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 (including associated construction costs) of the N.C. Department of Transportation Encroachment Agreement and all other local, state, and federal permits associated with the project.

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, engineering, and construction 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 bare all costs associated with cleanup.

SC-7.11.B Add the following new paragraph 7.11.B immediately after Paragraph 7.11.A:

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

SC-7.12 Safety and Protection

SC-7.12.C. Insert the following after the second sentence of Paragraph 7.12.C:

The following Owner safety programs are applicable to the Work: *[here expressly identify by title and/or date, any such Owner safety programs]. - None*

SC-7.18 Indemnification

SC-7.18. Paragraphs 7.18.A and 7.18.B are hereby modified as follows:

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, elected officials, directors, members, partners, employees, agents, consultants and

subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.

B. In any and all claims against Owner or Engineer or any of their officers, elected officials, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 8 – OTHER WORK AT THE SITE

SC-8.01 Other Work

SC-8.01. Add the following new paragraph 8.01.E immediately after Paragraph 8.01.D:

E. The prime contracts will be let in connection with the Project as outlined in the Summary of Work in the Specifications.

SC-8.02 Coordination

SC-8.02.A Delete Paragraphs 8.02.A and 8.02.B in their entirety and replace with the following:

A. **The Contractor shall coordinate work with the other prime contractors and subcontractors on the Site to ensure a safe, efficient working environment. Coordination may include, but is not limited to, scheduling delivery of materials, storage of materials, sequencing of construction involving different crafts, resolving interface issues between crafts, scheduling testing, and all other aspects of the Work that do not impact the design or function of the Work.**

SC-8.03 Legal Relationships

SC-8.03. Add the following new subparagraph E immediately after Paragraph 8.03.D:

E. If Contractor is delayed at any time in performing or furnishing Work by any act or neglect of another contractor, and Owner and Contractor are unable to agree as to the extent of any adjustment in Contract Times attributable thereto,

Contractor may make a Claim for an extension of times in accordance with Article 12. An extension of the Contract Time shall be Contractor's exclusive remedy with respect to Owner, Engineer, and construction coordinator for any delay, disruption, interference, or hindrance caused by any other contractor. This paragraph does not prevent recovery from Owner, Engineer, or construction coordinator for activities that are their respective responsibilities.

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

SC-10.03 Project Representative

SC-10.03 Add the following new subparagraphs B and C immediately after Paragraph 10.03.A:

B. The Resident Project Representative (RPR), if furnished by agreement of the Owner and Engineer, will be Engineer's representative at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions. RPR shall perform the following:

1. General: RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of Contractor. RPR shall generally communicate with Owner only with the knowledge of and under the direction of Engineer.

2. Schedules: Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.

3. Conferences and Meetings: Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings, and prepare and circulate copies of minutes thereof.

4. Liaison:

a. 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.

b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.

c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.

5. Interpretation of Contract Documents: Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.

6. Shop Drawings and Samples:

a. **Record date of receipt of Samples and Contractor-approved Shop Drawings.**

b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.

c. Advise Engineer and Contractor of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which RPR believes that the submittal has not been approved by Engineer.

7. Modifications: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, if any, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.

8. Review of Work and Rejection of Defective Work:

a. Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general, proceeding in accordance with the Contract Documents.

b. Report to Engineer whenever RPR believes that any part of Contractor's work in progress is defective, will not produce a completed Project that conforms generally to the Contract Documents, or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.

9. Inspections, Tests, and System Start-ups:

a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.

b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.

10. Records:

a. Prepare a daily report or keep a diary or log book, recording Contractor's hours on the Site, Subcontractors present at the Site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Engineer.

b. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.

c. Maintain records for use in preparing Project documentation.

11. Reports:

a. Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.

b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.

c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.

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

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

14. Completion:

a. Participate in Engineer's visits to the Site to determine Substantial Completion, assist in the determination of Substantial Completion and the preparation of a punch list of items to be completed or corrected.

b. Participate in Engineer's final visit to the Site to determine completion of the Work, in the company of Owner and Contractor, and prepare a final punch list of items to be completed and deficiencies to be remedied.

c. Observe whether all items on the final list have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the notice of acceptability of the work.

C. The RPR shall not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).

2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.

3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.

4. **Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor's work.**

5. **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.**

6. **Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.**

7. **Accept Shop Drawing or Sample submittals from anyone other than Contractor.**

8. **Authorize Owner to occupy the Project in whole or in part.**

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

SC-11.05 Change of Contract Times

SC 11.05.C. Add the following new subparagraph 11.05.C after Paragraph 11.05.B.

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

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

SC-13.01 Cost of the Work

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) Costs for equipment and machinery owned by Contractor will be paid at a rate shown for such equipment in the Rental Rate Blue Book (latest edition). An hourly rate will be computed by dividing the monthly rates by 176. These 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.

SC-13.03 Unit Price Work

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

E. The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment under the following conditions:

1. if the extended price of a particular item of Unit Price Work amounts to 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 25 percent from the estimated quantity of such item indicated in the Agreement; and

2. if there is no corresponding adjustment with respect to any other item of Work; and

3. if Contractor believes that Contractor has incurred additional expense as a result thereof, Contractor may submit a Change Proposal, or if Owner believes that the quantity variation entitles Owner to an adjustment in the unit price, Owner may make a Claim, seeking an adjustment in the Contract Price.

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

SC – 14.06 *Owner May Stop the Work*

SC 14.06.B. Add the following subparagraph B to Paragraph 14.06:

B. 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 14.06.

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

SC-15.01 Progress Payments

SC 15.01.B Add the following new subparagraphs (4) and (5) to Paragraph 15.01.B:

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

5. The Application for Payment form to be used on the project is EJCDC No. C-620. The Engineer must approve and certify all Applications for Payment before payment is made.

SC 15.01.D Delete Paragraph 15.01.D.1 in its entirety and is replaced as follows:

1. The Application for Payment with Engineer's recommendations will be presented to the Owner for consideration. If the Owner finds the Application for

Payment acceptable, the recommended amount less any reduction under the provisions of Paragraph 15.01 will become due 30 days after the Application for Payment is presented to the Owner, and the Owner will make payment to the Contractor.

SC-15.03 Substantial Completion

SC 15.03.B Add the following new subparagraph (1) 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, shall 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 Article 15.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

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

B. Disputes shall be resolved in accordance with the dispute resolution process adopted on February 26, 2002 by the N. C. State Building Commission. The "Rules Implementing Mediated Settlement Conferences in North Carolina Construction Projects" are attached to this section.

SC-17.01 Add the following new subparagraph C after Paragraph 17.01.B:

C. All parties agree that only the North Carolina courts shall have jurisdiction over the Contract and any controversies arising out of this Contract and this agreement shall be governed by and construed in accordance with the laws of the State of North Carolina. Mediation as provided for under this Article shall not be a condition precedent to litigation.

SC-17.02 Attorneys' Fees

SC-17.02 Add the following new Section 17.02 immediately after Paragraph 17.01 as follows:

SC-17.02 *Attorneys' Fees*

A. For any matter subject to final resolution under this Article, to the extent permitted by law, the prevailing party shall be entitled to an award of its attorneys' fees incurred in the final resolution proceedings, in an equitable amount to be determined in the discretion of the court, taking into account the parties' initial demand or defense positions in comparison with the final result.

ARTICLE 18 – MISCELLANEOUS

SC-18.04 Delete subparagraph 18.04.A in its entirety and replace as follows:

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, elected officials, 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.

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RULES IMPLEMENTING MEDIATED SETTLEMENT CONFERENCES IN NORTH CAROLINA PUBLIC CONSTRUCTION PROJECTS

Adopted
February 26, 2002

Table of Rules

Rule

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.

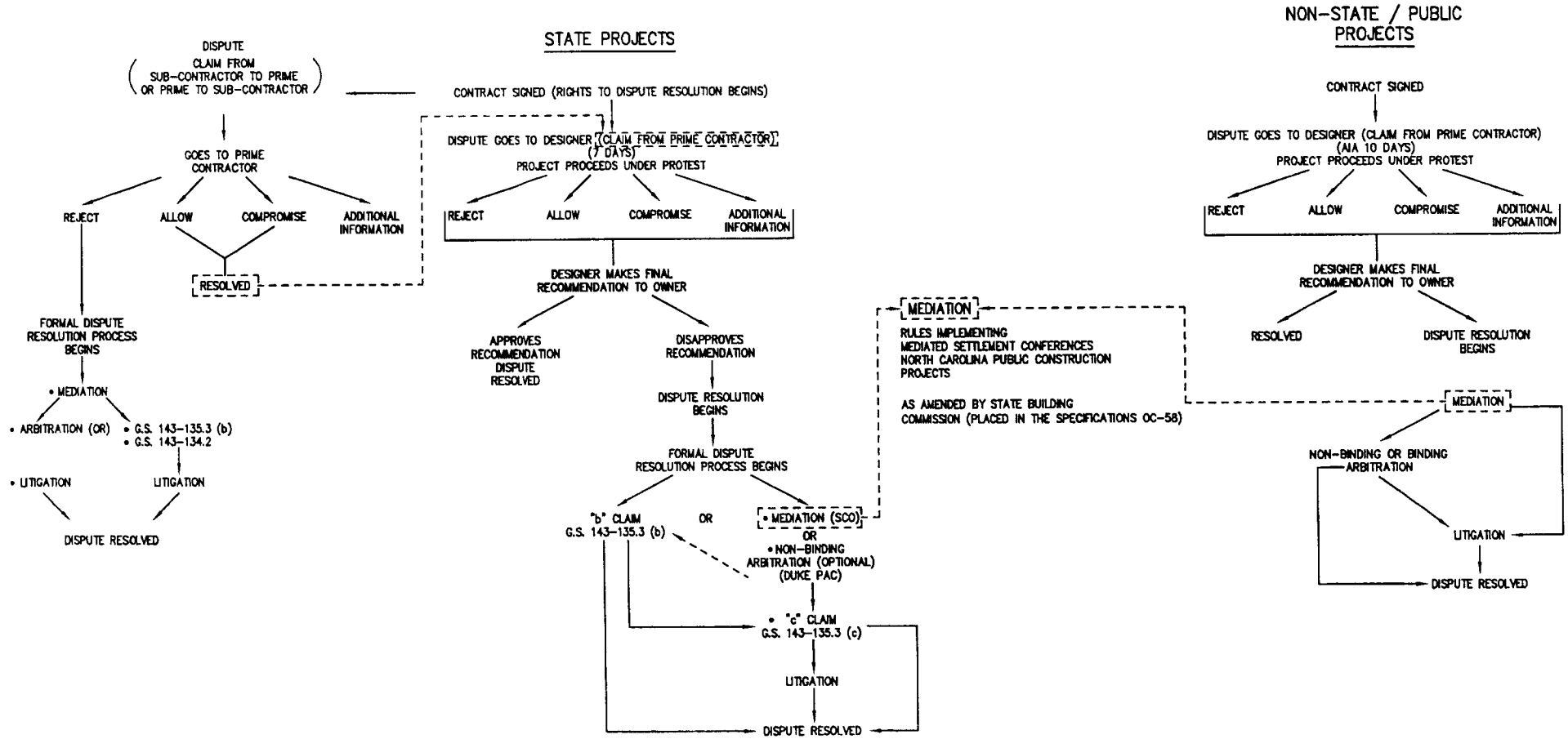
RULE 10. TIME LIMITS

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

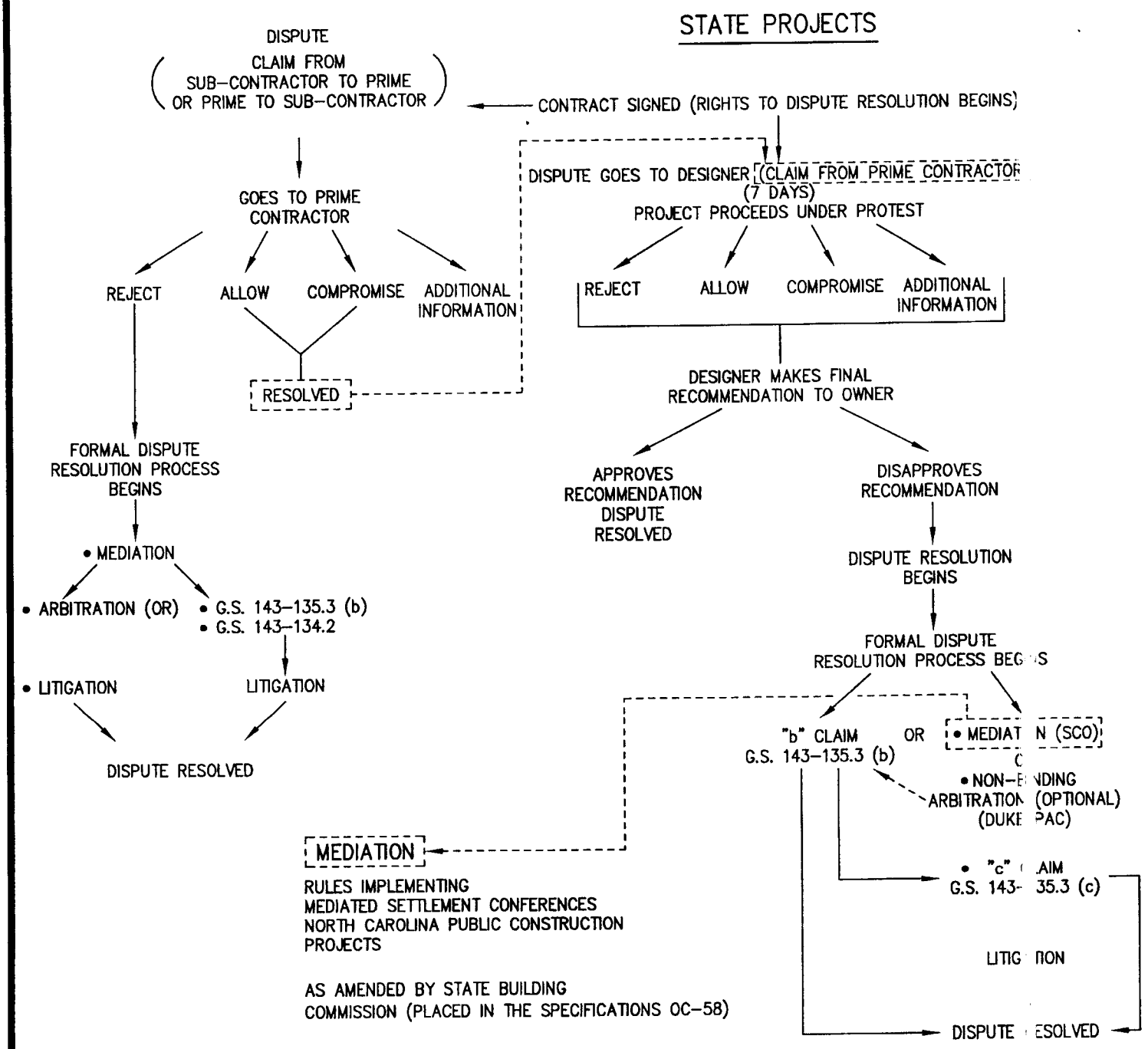
DISPUTE RESOLUTION



2/26/02

Exhibit A

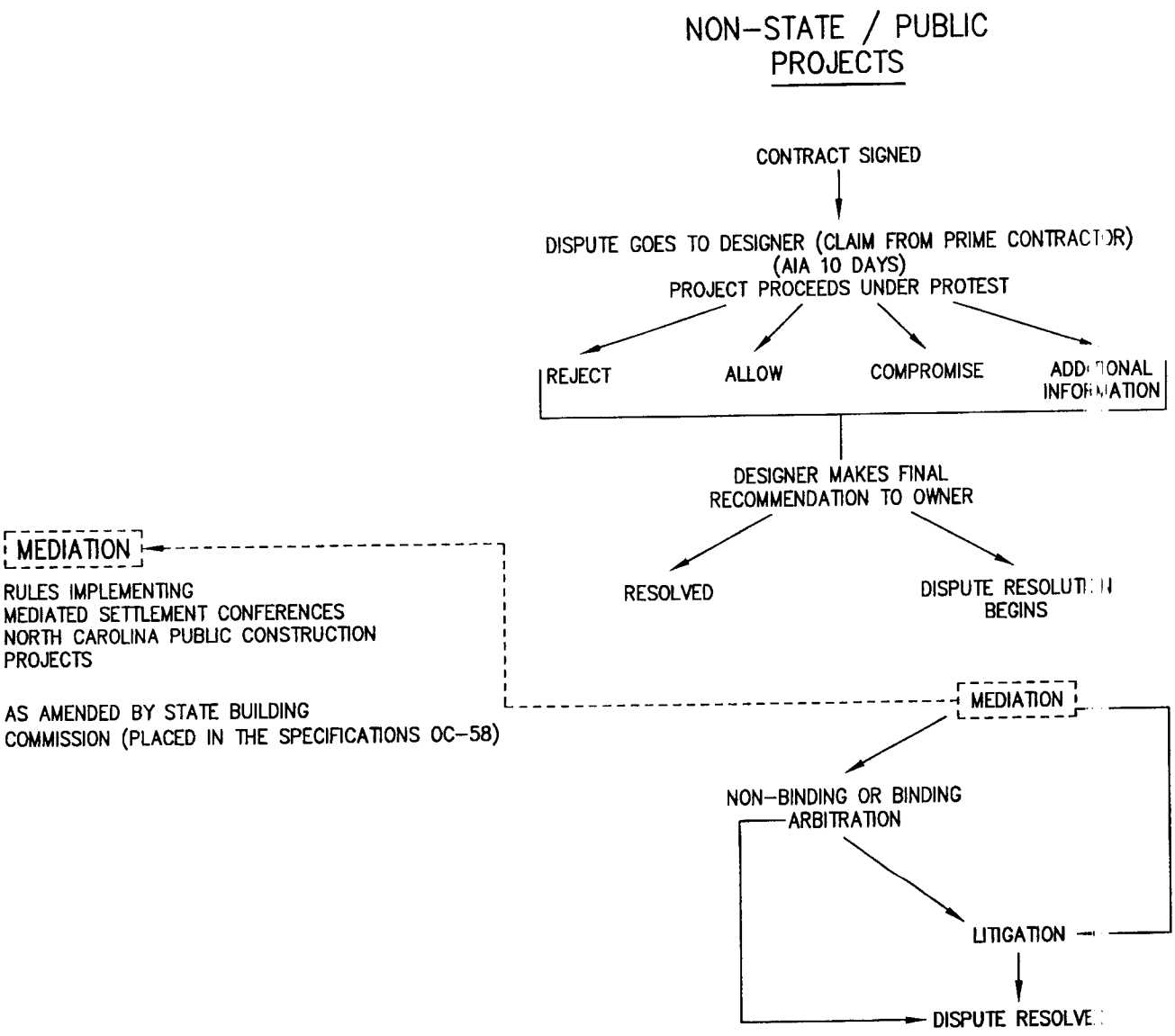
DISPUTE RESOLUTION



/26/02

Exhibit A

DISPUTE RESOLUTION



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SECTION 00 73 84

PROJECT PERMITS

1. NC-DEQ PWSS Water System Extension Permit (to be provided as part of a Bid Addendum or Bid Modification)
2. Federal Aviation Administration

END OF SECTION

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2024-ASO-72-OE
Prior Study No.
2022-ASO-25788-OE

Issued Date: 01/16/2024

Miles Galloway
Apex Tank 2
120 N Boylan Ave
Raleigh, NC 27603

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Water Tank Pleasant Park Elevated Tank
Location:	Apex, NC
Latitude:	35-42-09.29N NAD 83
Longitude:	78-53-08.37W
Heights:	383 feet site elevation (SE)
	237 feet above ground level (AGL)
	620 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is to be marked/lighted in accordance with FAA Advisory circular 70/7460-1 M, Obstruction Marking and Lighting, a med-dual system-Chapters 4,8(M-Dual),&15.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Air Missions (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

This determination expires on 07/16/2025 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.

(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

If construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

This determination cancels and supersedes prior determinations issued for this structure.

If we can be of further assistance, please contact our office at (817) 222-4832, or Michael.J-CTR.Costanzi@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2024-ASO-72-OE.

Signature Control No: 608585445-609585893 (DNE)
Michael Costanzi
Technician

Attachment(s)
Map(s)

Verified Map for ASN 2024-ASO-72-OE

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EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

Work Change Directive No.

Date of Issuance:		Effective Date:	
Owner:	Town of Apex	Owner's Contract No.:	
Contractor		Contractor's Project No.:	
Engineer:	The Wooten Company	Engineer's Project No.:	2519-CK
Project:	Pleasant Park 1.5 MG Elevated Water Tank	Contract Name:	N/A

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

Description:

Attachments: *[List documents supporting change]*

Purpose for Work Change Directive:

Directive to proceed promptly with the Work described herein, prior to agreeing to changes on Contract Price and Contract Time, is issued due to: *[check one or both of the following]*

☐ Non-agreement on pricing of proposed change.

☐ Necessity to proceed for schedule or other Project reasons.

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

Contract Price $ [increase] [decrease].

Contract Time days [increase] [decrease].

Basis of estimated change in Contract Price:

☐ Lump Sum ☐ Unit Price

☐ Cost of the Work ☐ Other

RECOMMENDED:	AUTHORIZED BY:	RECEIVED:
By:	By:	By:
Engineer (Authorized Signature)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Title:	Title:	Title:
Date:	Date:	Date:

Approved by Funding Agency (if applicable)

By: Date:

Title:

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EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

Change Order No. _____

Date of Issuance:		Effective Date:	
Owner:	Town of Apex	Owner's Contract No.:	
Contractor:		Contractor's Project No.:	
Engineer:	The Wooten Company	Engineer's Project No.:	2519-CK
Project:	Pleasant Park 1.5 MG Elevated Water Tank	Contract Name:	N/A

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

Description:

Attachments: *[List documents supporting change]*

CHANGE IN CONTRACT PRICE	**CHANGE IN CONTRACT TIMES** *[note changes in Milestones if applicable]*
Original Contract Price: $_____	Original Contract Times: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
[Increase] [Decrease] from previously approved Change Orders No. ___ to No. ___: $_____	[Increase] [Decrease] from previously approved Change Orders No. ___ to No. ___: Substantial Completion: _____ Ready for Final Payment: _____ days
Contract Price prior to this Change Order: $_____	Contract Times prior to this Change Order: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
[Increase] [Decrease] of this Change Order: $_____	[Increase] [Decrease] of this Change Order: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
Contract Price incorporating this Change Order: $_____	Contract Times with all approved Change Orders: Substantial Completion: _____ Ready for Final Payment: _____ days or dates

RECOMMENDED:	ACCEPTED:	ACCEPTED:
By: _____	By: _____	By: _____
Engineer (if required)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Title: _____	Title _____	Title _____
Date: _____	Date _____	Date _____

Approved by Funding Agency (if applicable)

By: _____ Date:

Title: _____

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EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

Field Order No. _____

Date of Issuance:		Effective Date:	
Owner:	Town of Apex	Owner's Contract No.:	
Contractor:		Contractor's Project No.:	
Engineer:	The Wooten Company	Engineer's Project No.:	2519-CK
Project:	Pleasant Park 1.5 MG Elevated Water Tank	Contract Name:	N/A

Contractor is hereby directed to promptly execute this Field Order, issued in accordance with General Conditions Paragraph 11.01, 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(s) _____ Drawing(s) / Detail(s)

Description:

Attachments:

ISSUED:	RECEIVED:
By: _____ Engineer (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____
Date: _____	Date: _____

Copy to: Owner

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SECTION 01 11 00

SUMMARY OF WORK

PART 1 GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

A. Work described in this Project Manual includes the provision of labor, materials, equipment, and services required to complete the Pleasant Park 1.5 MG Elevated Water Tank for the Town of Apex, North Carolina.

1.02 CONTRACTS

A. Project construction will be let under one Contract with construction including, but not limited to, the following major work items:
   1. 1,500,000 Gallon Elevated Storage Tank, Composite Style, and associated site work
      a. Site Clearing and Grading
      b. Temporary and Permanent Driveway
      c. Electrical and associated accessories
      d. Landscaping
   2. Water Mains
      a. 190 LF of 20-inch water main.

1.03 WORK SEQUENCE

A. Construction Progress Schedule, as required in Section, Submittal Procedures, shall indicate the anticipated items and times that the Work will interfere with normal facility operation.

B. Indicate cut-in between new work and existing waterline on the construction schedule. Submit proposed date for switchover in writing to Engineer and Owner a minimum of seven (7) days and again 24-hours in advance of actual field work. Owner shall have the right to delay Work due to operational requirements, without additional cost to Owner.

C. Perform cut-in after park's normal operational hours. This shall require night operations by Contractor at no additional compensation.

1.04 OWNER OCCUPANCY

A. The center of the proposed elevated tank is located in Pleasant Park which includes various sports complexes, sidewalks, roadways, and various utilities. Owner will occupy all of the park outside of the construction site during the entire period of construction.
   1. Coordinate with Owner on the identifying the location, removal, and turnover of irrigation valve boxes and sprinkler heads at no additional compensation. Existing irrigation supply line shall be stubbed and capped in an accessible location agreed upon by Owner.

B. Contractors shall cooperate with Owner to minimize conflict to the Park, and to facilitate Owner's operations.

C. Ingress and egress accessibility and site parking will be discussed at preconstruction conference and agreed upon with Owner.

1.05 CONTRACTOR USE OF SITE

A. The Project site is located at 1780 Kings View Trail, Apex, NC 27502 adjacent to the the entrance of Pleasant Park off of Old US 1. It is understood that the Park will include activities that include youth during the construction of the project. Contractor shall provide security of the work site for the safety of the citizens from the adjacent park. Full closures of either Pleasant Plains Road or Kings View Trail are not permitted during the duration of construction. Temporary lane closures are permitted for the purposes of equipment delivery and project construction.

B. The 20-inch water main to be tapped is on the main service line to the Park and it's respective facilities. Contractor shall coordinate the tie-in work for the proposed elevated storage tank with Owner.

C. Only Owner’s right to perform construction and maintenance operations with its own forces and to employ separate contractors on portions of the Project limits contractor’s use of site during the construction period. Work at the Project site by Owner will be coordinated with the Contractor.

D. Owner shall provide a staging area at the site for the Contractor as indicated on the Drawings. Staging, laydown, and spoil area not indicated on the Drawings or out of the project's limits of disturbance shall not be used without Owner's permission.

E. Contractor shall provide his own staging area as necessary for his Work beyond the easements and work areas indicated on the Drawings.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 31 13

PROJECT COORDINATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This Section specifies administrative and supervisory requirements necessary for Project coordination including, but not necessarily limited to:
   1. Coordination.
   2. Administrative and supervisory personnel.
   3. General installation provisions.
   4. Cleaning and protection.

1.02 GENERAL COORDINATION REQUIREMENTS

A. Responsibilities of Contractor:
   1. Coordinate construction activities for the Project to assure efficient and proper installation of each part of the Work.
   2. Where availability of space is limited, coordinate installation of components to assure maximum accessibility for maintenance. Make adequate provisions to accommodate components scheduled for later installation.
   3. Where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings. A copy of all memoranda shall be submitted to the Engineer.

B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
   1. Preparation of schedules.
   2. Installation and removal of temporary facilities.
   3. Delivery and processing of submittals.
   4. Progress meetings.
   5. Installation meetings.
   6. Project Close-out activities.

C. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
   1. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work. Refer to other sections for disposition of salvaged materials that are designated as Owner's property.

PART 2 PRODUCTS

2.01 NOT USED

PART 3 EXECUTION

END OF SECTION

SECTION 01 31 19

PROJECT MEETINGS

PART 1 GENERAL

1.01 MEETINGS

A. Pre-construction conference shall be held prior to the beginning of the Work.

B. Construction progress meetings shall be held monthly.

C. Project close-out conference shall be held during the final phases of the Work.

D. Engineer may schedule additional meetings.

E. Meetings scheduled by the Engineer shall be held at the Apex Public Works Building, Water Resources Administration - 105-B Upchurch St. Apex, NC 27502, unless otherwise dictated, i.e., project site.

F. Contractor's project superintendent shall attend meetings.

G. Notify suppliers and subcontractors to attend meetings as appropriate or as required by Engineer.

H. Contractor shall schedule pre-installation conferences as required in the individual specification sections.

I. Notify Engineer of project meetings scheduled by the Contractor.

J. Engineer will schedule and administer meetings throughout the progress of the Work, except for meetings held by the Contractor for normal coordination of the Work.

K. Meeting agenda shall include, but not be limited to, the following: Project Administration, Submittals, Construction Schedules and Methods, Safety and Health Regulations, Project Coordination, Payment Application, Change Orders, and Site Inspections.

L. Engineer will prepare agenda with copies to participants, preside at meetings, prepare minutes and distribute to participants for meetings scheduled by the Engineer.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This Section includes, but is not limited to, requirements for the following:
   1. Submittal procedures.
   2. Construction progress schedule.
   3. Schedule of values.
   4. Proposed product list.
   5. Project record documents.
   6. Certificates of compliance.
   7. Catalog data.
   8. Shop drawings.
   9. Manufacturer's installation procedures.
   10. Samples.
   11. Test and Startup reports.
   12. Operation and maintenance instructions.
   13. Warranties.
   14. Spare parts and maintenance materials.

1.02 SUBMITTAL PROCEDURES

A. Submittals shall be uploaded to the Project Sharefile™ and after review shall be downloaded. Contractor will be provided access permission upon Notice to Proceed.

B. Submittals shall be numbered as required by the Wooten submittal numbering convention that will be provided at the Notice to Proceed.

C. Cover letter for each submittal package shall list the following:
   1. Contractors name:
   2. Owners name: Town of Apex
   3. Project name: 1.5 MG Elevated Water Tank
   4. Wooten Job No.: 2519-CK

D. Individual submittals shall each be listed by the following information:
   1. Submittal reference no.
   2. Specification section number.
   3. Drawing and detail number when appropriate.
   4. Equipment.
   5. Type submittal.
   6. Supplier.
   7. Manufacturer.

E. Contractor shall provide a submittal log listing the submittals required and the expected dates for submittal.

F. Apply Contractor's stamp to each submittal, signed or initialed and dated, certifying that Contractor has reviewed submittal for conformance with requirements of Contract Documents, and has coordinated submittal with related work.

G. Schedule submittals to expedite Project, and deliver to coordinate submission of related items. Allow a minimum of fifteen (15) working days for Engineer's review.

H. Identify variations from Contract Documents and Product limitations as they relate to the satisfactory performance of the Project.

I. Provide space for Contractor and Engineer review stamps.

J. Revise and resubmit submittals as required; identify changes made since previous submittal.

K. Distribute reviewed submittals to concerned parties. Instruct parties to promptly report inability to comply with provisions.

L. Work requiring submittal review by Engineer shall not be started until review has been obtained.

M. Engineer's review of submittals shall not relieve Contractor of responsibility for complete compliance with Contract Documents.

1.03 ADMINISTRATIVE SUBMITTALS

A. Construction Progress Schedule
   1. Submit initial progress schedule 15 days after date of Owner-Contractor Agreement.
   2. Progress schedule shall be, as a minimum, a horizontal bar chart with a separate line for each major section of Work. Identify the first workday of each week.
   3. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.
   4. Indicate the expected monthly pay requests.
   5. Submit revised schedule with each Application for Payment as required for updating, identifying changes since previous version. Indicate estimated percentage of completion for each item of Work at each submission.
   6. Indicate submittal dates required for critical shop drawings, product data, samples, and product delivery dates.

B. Schedule of Values
   1. Submit schedule of values at least three (3) weeks prior to the first partial payment request. Schedule shall divide the lump sum contract items into major work tasks. Use the table of contents as a guide for itemizing the schedule. Schedule will be used only as a basis for review of the Contractor's request for payment.
   2. Engineer may request additional delineation of work tasks and supporting data of the values, as he deems appropriate. Revise schedule and resubmit.
   3. Revise schedule to list approved Change Orders, with each request for payment.

C. Project Record Documents
   1. Maintain on site, one set of the following record documents; record actual revisions to the Work:
      a. Contract Drawings.
      b. Project Manual.
      c. Addenda.
      d. Change Orders and other Modifications to the Contract.
      e. Reviewed submittals.
   2. Store Record Documents separate from documents used for construction.
   3. Record information concurrent with construction progress.

4. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
    a. Manufacturer's name and product model and number.
    b. Product substitutions or alternates utilized.
    c. Changes made by Addenda and Modifications.
5. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
    a. Measure elevations of structures in relation to survey bench mark.
    b. Measure and reference horizontal and vertical locations of underground utilities and appurtenances to existing permanent surface improvements that are indicated on the Drawings.
    c. Field changes from construction Drawings.
    d. Details not on original Contract Drawings.
6. Submit documents to Engineer with final Application for Payment.

1.04 TECHNICAL SUBMITTALS

A. General
    1. Submit the following as required by the individual sections of the technical specifications.

B. Certificates of Compliance
    1. Certificates shall certify that the Products delivered to the project are in conformance with the specifications.
    2. Certificates may be recent or previous test results on Product, but must be acceptable to Engineer.
    3. Certification shall not relieve the Contractor of responsibility for complying with requirements of the specifications.

C. Catalog Data
    1. When shop drawings are not required, the catalog data shall include the following as a minimum:
        a. Parts schedule that identifies the materials to be used in each of the various parts.
        b. Sufficient detail to serve as a guide for assembly and disassembly of the product and to serve as guide for ordering parts.
    2. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this Work in the Shop Drawing submittal.

D. Shop Drawing
    1. Shop drawings shall consist of drawings, diagrams, illustrations, schedules, performance charts, brochures and other data, prepared specifically for a portion of the Work.
    2. Shop drawings shall indicate the type, size, quantity, arrangement, location, mode of operation, component materials, utility connections, wiring and control diagrams, anchorage's, supports, factory applied coatings, and other information necessary to ensure satisfactory fabrication, installation and operation of the completed Work.
    3. Shop drawings shall establish the actual detail of manufactured or fabricated items, indicate proper relation to adjoining work, amplify design details of mechanical and electrical equipment in proper relation to physical spaces in the structure, and incorporate minor changes to design and construction to suit actual requirements.

E. Manufacturer's Installation Procedures
   1. Installation procedures should indicate manufacturer’s recommendations for proper installation of Product.

F. Test and Start-Up Reports
   1. Submit within seven (7) days of performing the test.
   2. Report shall include the following as a minimum:
      a. Owner's Name: Town of Apex
      b. Project Name: 1.5 MG Elevated Water Tank
      c. Wooten Job No. 2519-CK
      d. Firm performing work.
      e. Individual performing work.
      f. Specification section no.:
      g. Product tested or started.
      h. Date and time of work.
      i. Type of test or start-up.
      j. Specific location in the Project: (i.e. Structure name and location within the structure by a rough sketch.)
      k. Results.
      l. Opinion of firm doing the work as to the test or start-up being in compliance with the Contract Documents.
   3. When requested by Engineer, the testing or start-up firm shall provide additional interpretation of results.

G. Operation and Maintenance Instructions
   1. Submit operation and maintenance instructions within 45 days after approval of the shop drawings.
   2. Submit instructions in a navy blue vinyl, loose leaf binder containing the name of the equipment covered on the front and the spine of the binder. Provide tab dividers appropriately labeled.
   3. As a minimum, the submittal shall contain complete operation and maintenance instructions, drawings, and complete parts list.
   4. In addition, for equipment requiring periodic lubrication, provide two (2) lubrication charts; one shall be included in the binder, and the other shall be provided in weatherproof 10 mil. laminated plastic and shall be permanently affixed to the equipment. Charts shall contain pertinent information concerning the lubricating requirements including manufacturer's name, name of equipment, recommended service interval, and recommended lubricant, location of each of the points of lubrication.

H. Warranties
   1. Provide notarized copy.
   2. Assemble documents from Subcontractors, suppliers, and manufacturers.
   3. Provide Table of Contents and assemble in three D side ring binder with durable plastic cover.
   4. Submit prior to final Application for Payment.
   5. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

I. Spare Parts and Maintenance Materials
   1. Provide products, spare parts, maintenance, and extra materials in quantities specified in individual specification Sections.

2. Deliver to Project site and place in location as directed by the Owner. Obtain Owner's signature and date bill of materials as delivered to the site as required by this paragraph. Provide a copy of signed bill of materials to Engineer with request for payment.
3. Provide recommended manufacturer's list of spare parts, maintenance, and extra material as specified in individual specification sections.
4. Submit to Engineer.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01 45 00

QUALITY CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Quality assurance and control of installation.

B. Inspection and testing laboratory services.

1.02 QUALITY ASSURANCE/CONTROL OF INSTALLATION

A. Manufacturer shall have the minimum number of years of proven successful experience required in each section in the design, manufacture, and servicing of Products specified.

B. In lieu of the required experience, manufacturer may provide a cash deposit or bond equal to the cost of the Product, but pro-rated to the number of years of actual experience.

C. Products from a manufacturer who does not meet the experience requirements must meet technical requirements.

D. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.

E. Comply fully with manufacturers' instructions, including each step in sequence.

F. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

G. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

H. Perform work by persons qualified to produce workmanship of specified quality.

I. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.03 INSPECTION AND TESTING LABORATORY SERVICES

A. Independent testing services are required as outlined in the following section(s).
   1. Section 33 16 10, Elevated Water Storage Tank

B. Contractor shall contract for required soil, concrete and pile testing with the project GeoTechnical firm as follows:
   1. GeoTechnologies, Inc
      3200 Wellington Ct. #1
      Raleigh, NC 27615
      Office: 919.954.1514

C. Testing laboratory shall be authorized to operate in the state in which Project is located.

D. Testing laboratory shall have a full-time registered Engineer on staff to review services.

E. Testing equipment shall be calibrated at reasonable intervals with devices of an accuracy traceable to either National Bureau of Standards (NBS) standards or accepted values of natural physical constants.

1.04 LABORATORY RESPONSIBILITIES

A. Testing Laboratory shall have the following responsibilities for the Project:
   1. Attend pre-construction conferences and progress meetings as required by the Engineer.
   2. Collect and test samples of mixes.
   3. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.
   4. Perform inspection, sampling, and testing in accordance with Contract Documents and specified standards.
   5. Ascertain compliance of soil compaction and material mixes with requirements of Contract Documents.
   6. Promptly notify Engineer and Contractor of observed irregularities or nonconformance of Work or Products.
   7. Perform additional inspections and tests required by Engineer when specified tests have failed.

1.05 LIMITS ON TESTING LABORATORY AUTHORITY

A. The authority of the Testing Laboratory is limited as follows:
   1. May not alter requirements of Contract Documents.
   2. May not approve or accept any portion of the Work.
   3. May not assume duties of Contractor.
   4. Has no authority to stop the Work.

1.06 LABORATORY REPORTS

A. After each inspection and test, the independent testing firm shall submit report(s) as specified in Section, Submittal Procedures.

1.07 CONTRACTOR RESPONSIBILITIES

A. Unless specified otherwise, deliver to laboratory at designated location, adequate samples of materials proposed to be used that require testing. The proposed mix designs shall be included with delivery.

B. Cooperate with laboratory personnel, and provide access to the Work and to manufacturer's facilities as specified.

C. Provide incidental labor and facilities to provide access to Work to be tested, to obtain and handle samples at the site and at source of products to be tested, to facilitate tests and inspections, storage, and curing of test samples.

D. Notify Engineer and laboratory 24 hours prior to expected time for operations requiring inspection and testing services.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary Utilities: Electricity, lighting, water, and sanitary facilities.

B. Work on public right-of-way.

C. Traffic control.

D. Temporary Controls: Barriers, water control, dust control, erosion and sediment control , and protection of the Work.

E. Construction Facilities: Progress Cleaning and parking.

1.02 TEMPORARY UTILITIES

A. Electricity
   1. Contractor to provide and pay for required power service for construction from Town of Apex Electric Department.

B. Lighting
   1. Provide and maintain lighting for construction operations as required by Contractor.
   2. Provide and maintain lighting to exterior staging and storage areas after dark for security purposes as required by Contractor.

C. Water
   1. Provide, maintain, and pay for suitable quality water, including any necessary service(s) required for construction operations. Exercise measures to conserve water during construction.
   2. Contractor shall be required to extend water lines or provide hauling as required for Contractor's use from existing site hydrants as designated by the Owner. Temporary hydrant meters are available from Owner. No connection shall be made to Town hydrant without Owner approval.

D. Sanitary Facilities
   1. Provide and maintain required facilities and enclosures as necessary to comply with the laws and ordinances of the authority having jurisdiction and the State of North Carolina.
   2. General Contractor shall provide the above sanitary facilities for all contractors, sub-contractors, Owner and Engineer at the Project Site.
   3. Existing facilities shall not be used.

1.03 TRAFFIC CONTROL

A. On public and private road rights-of-way provide traffic control devices when construction encroaches within the right-of-way. Devices shall include, but not be limited to, cones, drums, flares, warning signs, temporary pavement marking, warning lights, and flagman.

B. Traffic control devices shall provide the following:
   1. Protection of motorists, pedestrians and workers from accident hazards.

2. Advance public information of proposed work sites.
3. Establishment of an orderly and safe flow of traffic and to minimize traffic congestion.
4. Provision of access for emergency vehicles.

C. Traffic control devices shall be used in accordance with the latest edition of the NC DOT "Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD)."

D. Provide personnel trained in traffic control. Certified flaggers must present certification card immediately upon request.

1.04 TEMPORARY CONTROLS

A. General
1. Temporary controls shall be the responsibility of each Contractor for their respective work unless noted otherwise.

B. Barriers
1. Provide barriers to prevent unauthorized entry to construction areas for the safety of the public, the protection of the work, and to protect existing facilities and adjacent properties from damage from construction operations.
2. Provide barricades required by agency for public rights-of-way and for public access to existing buildings.
3. Provide protection for plant life designated to remain. Replace damaged plant life.
4. Protect vehicular traffic, stored materials, site, and structures from damage.

C. Water Control
1. Grade site to drain. Provide, operate, and maintain pumping equipment to maintain excavations free of water.
2. Protect site from running water.

D. Dust Control
1. Execute Work by methods designed to minimize raising dust from construction operations.
2. Provide positive means to prevent airborne dust from dispersing into atmosphere.

E. Erosion and Sediment Control
1. Provide Erosion and Sediment Control as indicated on the Drawings and specified in Section, Erosion Control. No mud or debris from construction activities are to be tracked into street.

F. Protection of Installed Work
1. Protect installed Work and provide special protection where specified in individual specification Sections.
2. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.
3. Prohibit traffic from landscaped areas.

1.05 CONSTRUCTION FACILITIES

A. General
1. Construction facilities shall be the responsibility of each Contractor for their respective work unless noted otherwise.

B. Access Roads
   1. Contractor shall construct and maintain temporary drives as necessary to access public thoroughfares and existing drives to serve the construction area.
   2. Provide means of removing mud from vehicle wheels before entering street.

C. Parking
   1. When site space is not adequate, arrange for temporary off site surface parking areas to accommodate construction personnel.
   2. Do not allow vehicle parking in existing right-of-way or to block existing drives.
   3. Do not allow vehicle parking on private property without prior approval.

D. Progress Cleaning
   1. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
   2. Remove waste materials, debris, and rubbish from site periodically and dispose off site.

1.06 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary above grade or buried utilities, equipment, facilities, and materials, prior to final Inspection.

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

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

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Products.

B. Transportation and handling.

C. Storage and protection.

D. Product options.

E. Substitutions.

1.02 PRODUCTS

A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying, and erection of the Work. Products may also include existing materials or components specified in the Contract Documents for reuse.

1.03 TRANSPORTATION AND HANDLING

A. Transport and handle Products in accordance with manufacturer's instructions.

B. Ship fabricated assemblies in largest sections permitted by carrier regulations and properly marked for ease of field erection.

C. Promptly inspect shipments to assure that Products comply with specified requirements, quantities are correct, and Products are undamaged.

D. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.04 STORAGE AND PROTECTION

A. Keep on site storage of material to a minimum.

B. Store and protect Products in accordance with manufacturer's instructions in unopened original packages, with seals and labels intact and legible. Store sensitive Products in weather-tight, climate-controlled enclosures.

C. For exterior storage of fabricated Products, place on sloped supports, above ground.

D. Provide off site storage and protection when site does not permit on site storage.

E. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.

F. Store loose granular Products on solid flat surfaces in a well drained area. Prevent mixing with foreign matter.

G. Arrange storage of Products to permit access for inspection. Periodically inspect to assure Products are maintained under specified conditions.

H. Take precautions to prevent fire.

1.05 DAMAGED PRODUCTS

A. Remove damaged Products from Project site.

1.06 PRODUCT OPTIONS

A. Products Specified by Reference Standards: Product meeting standard and specific requirements of these specifications.

B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming Three Manufacturers with an "or equal" Provision for Substitutions: Submit a request for substitution for manufacturer not named during the shop drawing submittal.

1.07 SUBSTITUTIONS

A. Engineer will consider requests for Substitutions only within 30 days after date of Owner-Contractor Agreement.

B. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.

C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

D. Request constitutes a representation that Contractor:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
   2. Shall provide same warranty for Substitution as for specified product.
   3. Shall coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.
   5. Shall reimburse Owner for review or redesign services associated with reapproval by authorities.

E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

F. Substitution Submittal Procedure:
   1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
   2. Submit shop drawings, product data, and certified test results attesting to proposed product equivalence.
   3. Engineer will notify Contractor, in writing, of decision to accept or reject request.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01 70 00

EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination.

B. Cutting and patching.

C. General installation provisions.

D. Cleaning and protection.

E. Final inspection and tests.

F. Adjusting.

G. Close-out procedures.

1.02 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual specifications sections.

D. Verify that utility services are available, of the correct characteristics, and in the correct locations.

1.03 CUTTING AND PATCHING

A. General
   1. Do not cut, or alter the work of other contractors without written approval of the Engineer.
   2. Work removed shall be replaced or repaired by the Contractor who removed or damaged the work, and a craftsman, skilled in the trade that the particular replacement requires, shall do the work. (i.e.: A mason, not an electrician, shall replace masonry removed by the Electrical Contractor.)
   3. Conduct removal operations in a manner that will eliminate hazards to persons and property and prevent the release of dust and rubbish into the air. Existing work, which is to remain and is damaged by contract operations shall be replaced with new materials at no additional cost to the Owner.
   4. For replacement of work removed, comply with specifications for type of work to be done.

B. Inspection
   1. Inspect existing conditions of work including elements subject to movement or damage during cutting and patching, and excavating and backfilling.
   2. After uncovering work, inspect conditions affecting installation of new products.

C. Preparation prior to cutting

1. Provide shoring, bracing, and support as required to maintain structural integrity of project.
2. Provide protection for other portions of project.
3. Provide protection from elements.

D. Performance
1. Execute fitting and adjustment of products to provide finished installation to comply with specified tolerances, finishes.
2. Execute cutting and demolition by methods to prevent damage to other work and provide proper surfaces to receive installation of repairs and new work.
3. Execute excavating and backfilling as specified in Section, Trenching for Utilities.
4. Restore work, which has been cut or removed; install new products to provide completed work in accordance with requirements of contract documents.
5. Refinish entire surfaces as necessary to provide an even finish.
   a. Continuous Surfaces: To nearest intersections.
   b. Assembly: Entire Refinishing.

1.04 GENERAL INSTALLATION PROVISIONS

A. Require Installer of each major component to inspect conditions under which Work is to be performed. Clean substrate surfaces prior to applying next material or substance. Do not proceed until unsatisfactory conditions have been corrected.

B. Comply with manufacturer's recommendations to the extent that they are more explicit or stringent than requirements contained in Contract Documents.

C. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.

D. Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Engineer for final decision.

E. Check dimensions before starting each installation.

F. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.

G. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.

H. Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Engineer for final decision.

1.05 COMPLAINT RESPONSE

A. A Complaint Response Procedure shall be established to ensure that complaints resulting from construction operations are adequately attended to in a timely manner. As a minimum the Contractor’s procedure shall be as follows:
1.
2. Maintain a log of the complaints with the date of receipt, type of complaint, address of the location of complaint, individual to contact for complaint,

description of issue, date resolved and method of resolution.

3. Engineer shall note the complaint as an urgent or non-urgent complaint.
4. Urgent Complaint: Investigate and resolve the complaint within 24 hours of the notification.
5. Non-Urgent Complaint: Investigate and resolve within seven (7) days.
6. The time to resolve a complaint may be established as shorter or longer as may be mutually agreed to by pertinent parties.
7. If a complaint has not been resolved by the above time or agreed to extension, the Owner may proceed to act in accordance with the applicable terms of the Contract Documents which includes:
   a. Allow additional time for Contractor to satisfactorily resolve, or
   b. Give Contractor 7 calendar days' notice that the Owner will remedy the complaint and back charge the Contractor for costs incurred, or
   c. Retain additional monies as part of partial payment retainage until the complaint is resolved.
8. In the case of an emergency, the Contractor representative will be notified by phone that immediate action is required. If necessary the Owner may elect to secure site and back charge the Contractor.

1.06 CLEANING AND PROTECTION

A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration.

B. Clean and maintain completed construction as frequently as necessary through the construction period. Adjust and lubricate components as required to ensure proper operation.

C. Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, or dangerous exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:
   1. Excessive static or dynamic loading.
   2. Excessive internal or external pressures.
   3. Excessively high or low temperatures.
   4. Thermal shock.
   5. Air contamination or pollution.
   6. Water or ice.
   7. Abrasion.
   8. Heavy traffic.
   9. Misalignment.
   10. Improper shipping or handling.
   11. Theft.
   12. Vandalism.

D. Clean Project prior to final inspection. Project clean up shall include, but not be limited to, the following:
   1. Remove temporary labels.
   2. Repaint damaged paint surfaces.
   3. Sweep paved areas.
   4. Rake clean landscaped surfaces.
   5. Remove waste and surplus materials.
   6. Remove temporary construction facilities.

1.07 FINAL INSPECTION AND TESTS

A. Prior to final acceptance place equipment in operation and make necessary adjustments for proper operation. Test equipment under normal operating conditions in the presence of Engineer. Test shall show conclusively that requirements of the specifications have been fulfilled.

B. Complete punch list items within 30 days of receipt from Engineer. Owner may have work not completed within 30 days performed by others with the cost deducted from Contractor’s final payment. Additional engineering and inspection services required as a result of Contractor not completing punch list within 30 days shall be at Contractor's expense.

1.08 ADJUSTING

A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

1.09 CLOSE-OUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and is complete in accordance with Contract Documents and ready for Engineer's inspection.

B. Provide submittals to Engineer that are required by governing or other authorities.

C. Submit set of Record Documents indicating changes during construction as required in Section, Submittal Procedures.

D. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and final amount due.

E. Submit the following with final Application for Payment:
   1. Affidavit of Release of Liens
   2. Consent of Surety for Final Payment
   3. Affidavit of Payment of Debts and Claims

F. Submit warranties as required by individual equipment specifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete materials

B. Concrete

C. Reinforcement

D. Form work

E. Grout

F. Mixing, placing, and curing

G. Concrete finishing

1.02 REFERENCE STANDARDS

A. The latest revision, at the time of bidding, of the publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
   1. American Concrete Instiute (ACI)
      a. 301
      b. 318
   2. American Society of Testing Materials (ASTM)
      a. A307 Carbon Steel Externally Threaded Standard Fasteners.
      b. C39 Test for Compressive Strength of Cylindrical Concrete Test Specimens.
      c. C94 Ready Mixed Concrete
      d. C143 Test for Slump of Portland Cement Concrete.
      e. C171 Sheet Materials for Curing Concrete.
      f. C192 Making and Curing Concrete Test Specimen.
      g. C231 Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
      h. C309 Liquid Membrane-Forming Compounds for Curing.
      i. C920 Elastomeric Joint Sealants
      j. D1751 Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
   3. N. C. Department of Transportation - Standard Specifications for Roads and Structures (NC DOT).
   4. Concrete Reinforcing Steel Institute (CRSI)

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00, Submittal Procedures:
   1. Test Reports:
      a. Laboratory Mix Design: Mix design shall be in accordance with ACI 318, Section 5.3 (Field Experience and / or Trial Mixtures). Design mixes shall be accompanied by test results from an independent commercial testing

laboratory, attesting that the proportions selected will produce specified concrete.
   b. Concrete Tests: Reports for 7-day and 28-day concrete compressive strengths.
2. Catalog Data: Manufacturer standard drawings or catalog cuts for the following. Clearly indicate equipment to be furnished for the Project including options to be provided for the following.
   a. Water stops.
   b. Forming accessories
   c. Admixtures
   d. Patching compounds
   e. Joint systems
   f. Curing compounds
   g. Dry-shake finish materials.
3. Shop Drawings: Project specific shop drawings for the following:
   a. Reinforcing Steel: Shop drawings shall comply with ACI SP-66 “ACI Detailing Manual”. Shop drawings shall be drawn to a scale of 1/4" = 1' - 0" or larger. Where necessary for clear delineation, complicated wall steel shall be shown on inside and outside elevations. Bars shall be clearly shown, accurately located, and dimension on the plans, elevations, and sections.
4. Delivery Tickets: Submit copy of delivery tickets to the Engineer for each batch of ready mixed concrete in accordance with ASTM C-94. Indicate total water content.

1.04 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI SPEC-301 and ACI CODE-318 and CRSI "Manual of Standard Practice" as a minimum.

B. Follow recommendations of ACI PRC-305 when concreting during hot weather.

C. Follow recommendations of ACI PRC-306 when concreting during cold weather.

D. Methods and materials of work shall conform to the requirements of the standards and codes and recommended practices as referred to within this section.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Reinforcement Steel: Store reinforcement in a manner that will avoid excessive rusting or coating by grease, oil, dirt, and other objectionable materials. Store in separate piles so as to avoid confusion or loss of identification after bundles are broken.

B. Protect cement from contamination or damage during handling. Do not use cement which has been damaged, is partially set, lumpy or caked. If the damaged cement is in bags, the entire contents of the bag shall be rejected. Do not use cement salvaged from used bags or reclaimed from cleaning bags.

PART 2 PRODUCTS

2.01 CEMENT

A. Portland cement shall comply with ASTM C-150, Type I unless otherwise specified.
   1. Different brands of cement, different types of cement, or the same brand of cement from different mills shall not be mixed, nor shall they be used

alternately, except when authorized by the Engineer.

2. Measure cement by the bag as packaged by the manufacturer, or by weight; one bag of cement shall be considered to contain 94 pounds net. A barrel is equivalent to 4 bags or 376 pounds net.
3. When bulk cement is used, the weighing and handling shall be inspected by the Engineer prior to use.
4. Pozzolans or fly ash conforming to ASTM C618 may be blended with the cement. The maximum pozzolan or fly ash content shall not exceed 25 percent by weight of the total cement material.

B. A concrete mix design utilizing expansive or shrinkage compensating concrete may be proposed for use in large concrete structures.

2.02 ADMIXTURES

A. Air-entraining admixtures shall conform to ASTM C-260. Testing in accordance with ASTM C-233 will be waived provided the admixture has been tested and accepted by the Bureau of Public Roads, U.S. Department of Transportation, or provided a statement is submitted by the manufacturer that the admixture to be furnished for the project has been tested and conforms to ASTM C-260.

B. Water-reducing admixture shall conform to ASTM C-494, Type A or Type D and shall be chloride free.

C. Non-corrosive accelerator admixture shall conform to ASTM C-494, Type C or E, and have long term test data proving its non-corrosive effect on metal deck and reinforcing steel. Admixture shall be "Accelguard" by the Euclid Chemical Company, "Darex Set Accelerator" by W. R. Grace and Company, or equal.

D. Shrinkage reducing admixture shall be “eclipse shrinkage reducing admixture” by Grace Construction Products or equal.

2.03 AGGREGATES

A. Fine aggregate for use in classes of concrete (except lightweight concrete) and Portland cement mortars, except mortars for masonry work, shall conform with ASTM C33 and as specified in accordance with NCDOT Section 1014, "Aggregate for Portland Cement Concrete", Para. 1014-1, "Fine Aggregate", and graded as specified in Table 1005-2 of Section 1005. Fine aggregate for lightweight concrete shall be as specified above or lightweight sand as necessary to meet the required density and compressive strength.

B. Coarse aggregate for normal concrete, except as specified otherwise herein, shall be in accordance with ASTM C33 and graded as specified in NCDOT Table 1005-1 of Section 1005. Coarse aggregate for lightweight concrete shall be as specified in ASTM C-330 as required to meet the density and compressive strength requirements.

2.04 REINFORCEMENT

A. Metal reinforcement shall be Grade 60 and conform to ASTM A615. Bars shall be deformed except 1/4 inch round bars which may be plain. Bars shall be formed to the dimensions indicated and approved on the shop drawings. Fabrication and details on reinforcement shall conform to the requirements of the ACI 318, Chapter 7, "Details of Reinforcement". Heating for bending shall be employed only when approved by Engineer.

B. Welded wire fabric shall conform to ASTM A185 or A497. Where the size and weight of welded wire fabric is not indicated or specified, it shall be 6 x 6 inch mesh of 0.192 inch nominal-diameter wire and shall weigh approximately 42 pounds per 100 square feet.

C. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI specifications.
   1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
   2. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are protected by plastic (CRSI, Class 1) or stainless steel (CRSI, Class 2).

2.05 FORMS

A. Forms except as otherwise specified shall be of plywood, steel or other approved material. Plywood shall be concrete form plywood, not less than 5/8 inch thick. Surfaces of steel forms shall be free from irregularities, dents, and sags.

2.06 MISCELLANEOUS PRODUCTS

A. Bonding and patching compounds: Compounds for bonding, patching, and structural repairs, shall be “Euco Weld” by Euclid Chemical Company, "Colma Dur Mortar", "Sikadur Hi-Mod" by Sika Chemical Corporation, or equal.

B. Non-shrink Grout: Factory premixed non-shrink, non-metallic grout with minimum compressive strength of 5,000 PSI at 24 hours and 9,000 PSI at 28 days. Grout shall be "Euco N-S" by The Euclid Chemical Company, "Masterflow 713" by Master Builders, Sonogrout by Sonneborn Company, or equal.

C. Waterstops: Vinyl meeting U.S. Corps of Engineers' Specification CFD-C572-71, 6 inch minimum width and 3/8 inch thickness, of the rib-center bulb or dumbbell type.

D. Expansion Joint Filler: Bituminous impregnated, preformed type conforming to ASTM D 1751.

E. Concrete curing paper: Conform to ASTM C 171, Type 1, Waterproof Paper, shall be used. Polyethylene or similar plastic sheets shall not be used for concrete curing. Sisalkraft "Orange Label," Ludlow Papers, Inc., "Scuf-Champ," "Glas-Kraft" Grade A, or equal.

F. Joint sealer: Shall conform to ASTM C 920, Type M, Grade P, Class 25, Use T. Joint sealer for water containment structures shall be Polysulfide Type. Provide concrete primer as recommended by sealant manufacturer and compatible with the substrate.

G. Anchor bolts: Shall conform to ASTM A 307, Section 1c,Grade A.

H. Plain washers for anchor bolts: Shall conform to "Plain Washers," ANSI B18.22.I-1965 (R1975), Type A. Furnish one washer with each anchor bolt, unless otherwise noted on the Drawings.

I. Membrane forming curing compound: Liquid membrane forming curing compounds shall be wax free resin-type capable of retaining 95 percent of the moisture for the specified curing period and shall conform to ASTM C309, Type I-D, and shall contain a red fugitive dye. Curing compound applied to surfaces to be left

permanently exposed to view shall not cause permanent discoloration or otherwise adversely affect the appearance of surface.

J. Curing compound: Shall be "Super Floor Coat" or "Super Pliocure" by Euclid Chemical Company, "Masterseal" by Master Builders, Kure-N-Seal by Sonneborn, or equal. Compound shall conform to Federal Specification TT-C-800A, 30% solids content minimum.

K. Abrasive aggregate for non-slip finish: Crushed ceramically bonded aluminum oxide grits as abrasive aggregate for non-slip finish. Material shall be factory-graded, packaged, rust-proof and non-glazing, and unaffected by freezing moisture and cleaning materials and equal to "Frictex" by Sonneborn Building Products, Inc., "Korundum" by Concrete Service Materials Company, "Non-Slip" by Euclid Chemical Company.

L. Liquid chemical floor hardener: Colorless, aqueous solution containing a blend of magnesium fluosilicate and zinc fluosilicate combined with a wetting agent, containing not less than 2 pounds of fluosilicate per gallon. Material shall be "Hornolith" by A. C. Horn Co., "Saniseal 50" by Master Builders Co., or "Lapidolith" by Sonnebom Building Products, Inc or equal.

M. Stone under slab: Clean NC DOT size No.67 coarse aggregate.

N. Vapor barrier under slabs: "Moistop," by the Fortifiber Corporation or equal.

O. Structural steel shapes and plates to be embedded in or anchored to the concrete shall conform to ASTM A 36-93.

PART 3 EXECUTION

3.01 GENERAL

A. Provide a minimum of 4 inches of stone under concrete slabs on grade unless noted otherwise on Drawings.

B. Provide a vapor barrier under interior concrete slabs on grade unless noted otherwise on drawings.

C. Provide a two coat treatment of a liquid chemical floor hardener to interior concrete floor surfaces to be left permanently exposed to view.

D. Provide a "dry shake" application of abrasive aggregate for non-slip finish on exterior concrete platforms, steps and landings, and interior and exterior concrete ramps. shall receive a Ceramically bonded aluminum oxide grits as abrasive aggregate for non-slip finish.

E. Provide joint sealing compound at locations indicated on the Drawings and at joints in interior and exterior floor slabs to be left permanently exposed to view. Color of joint sealing compound for exposed joints shall match concrete color.

F. Install waterstops in accordance with manufacturer's instruction and securely anchor to reinforcing bars or forms to prevent displacement during placing of concrete.

G. Provide joint sealer locations indicated on the Drawings and between points of contact between slabs and vertical surfaces. Provide joint filler between horizontal concrete surfaces at expansion and isolation joints, unless otherwise noted on the Drawings.

3.02 CONCRETE MIX

A. General: Provide normal weight, air-entrained concrete except where specified or indicated on the Drawings to be lightweight concrete. Interior slabs, subject to abrasion, shall have a maximum air content of 3 percent. Concrete shall contain the specified water-reducing admixture. Thin slabs (less than 8 inches thick) placed below 50 degrees F shall contain a non-corrosive accelerator. Each mix shall be proportioned as specified by weight and use the aggregate and cement proposed for the project. Mix designs shall be in accordance with ACI specifications.

B. Design of Concrete: Provide concrete mix designs and engage an independent testing laboratory, approved by the Engineer, to prepare the mix designs for the classes of concrete specified in the "Properties and Location of Concrete" table which follows. Materials and proportioning shall be in accordance with the ACI Specifications, unless otherwise specified.
   1. Submit mix designs, test data, laboratory strength tests and certificates of analysis for cement and aggregates prior to the placement of concrete.
   2. Proportion concrete mixes to be placed by pumping for the type of equipment to be used so as to have a continuous flow of concrete through the pumping system.

      Properties and Location of Concrete:

Concrete Class(Location)	Min 28-day Compressive Strength (6"x 12" Cylinders)	Maximum Allowable Course Aggregate Size & Type	Slump	Total Air Content By Volume	*Max W/C Ratio
Liquid Retaining Structures	4,500 psi	1-1/2" Stone	2"-4"	4-1/2% + 1 1/2%	0.35
Exterior Slabs	3,500 psi	3/4" Stone	2"-5"	6% + 2%	0.40
Interior Slabs	3,500 psi	3/4" Stone	2"-5"	N/R	0.40
Footings - Building	3,000 psi	1-1/2" Stone	2"-4"	Not Reqd	0.58
All Other Concrete	3,000 psi	3/4" Stone	2"-4"	5% + 1 1/2%	0.46

      * Including free surface moisture on aggregates and liquid admixtures. W/C ratio is maximum permissible ratio for concrete when strength data from field experience or trial mixtures are not available. Higher ratios may be acceptable provided documentation is submitted in accordance with ACI Specifications. The maximum permissible W/C ratio for liquid retaining structures shall be 0.45.
   3. If expansive or shrinkage compensating concrete or shrinkage reducing admixtures are proposed for use in concrete for liquid retaining structures, increased spacing of construction joints may be proposed. Submit request for modification along with recommendation from material supplier for review along with mix design.

3.03 MEASUREMENT OF MATERIALS, MIXING, AND EQUIPMENT

A. Concrete shall be machine mixed except in emergencies mixing may be by hand as directed. Except when ready-mixed concrete is used, provide an approved type of

batch mixer at the site equipped with an accurate water measuring and control device and capable of producing a homogeneous concrete mixture of uniform color. Apparatus provided for weighing aggregate and cement shall be designed especially for this purpose. Weigh fine and coarse aggregate and cement separately. Cement in standard packages need not be weighed, but bulk cement or fractional packages shall be weighed. Accuracy of measuring devices shall be such that successive quantities can be measured to within one percent of required amount. Measuring devices shall be subject to verification. Do not exceed rated capacity of mixer. Time of mixing after cement and aggregates are in the mixer drum shall not be less than one minute for one cubic yard or less and increased 15 seconds for each additional cubic yard or fraction thereof in capacity. The total required water shall be in the drum before one-fourth of the mixing time has elapsed. Mixer drum shall rotate at a peripheral speed of about 200 feet per minute throughout the mixing period. Discharge entire contents of mixer drum before recharging. Provide necessary equipment and establish accurate procedures subject to Engineer's approval for determining the quantity of free moisture in the aggregates. Moisture determination shall be made at intervals as directed by Engineer. The retempering of concrete which has partially hardened, i.e., mixing with or without additional cement, aggregate, or water, will not be permitted.

3.04 READY-MIXED CONCRETE

A. Ready-mixed concrete plant shall be properly equipped for the accurate proportioning and proper mixing and delivery of the concrete, including the proper water measurements and controls, as specified above. Plant shall have sufficient capacity and transportation equipment to deliver the concrete at the required rate. Plant shall be subject to inspection and approval of the Engineer.

B. Mix and handle ready-mixed concrete in accordance with ASTM C-94.

3.05 CONVEYING

A. Convey concrete from mixer to its final position as rapidly as practicable by approved methods which will not cause segregation or loss of ingredients. Deposit concrete as nearly as practicable in its final position to avoid rehandling. Free vertical drop of concrete shall not exceed 3 feet. Chuting will be permitted only where the concrete is deposited into a hopper before it is placed in the forms. Clean conveying equipment before each run. Deposit concrete as soon as practicable after the forms have been coated and the reinforcement placed. Place concrete before the initial set and not later than 30 minutes after mixing or agitating. Concrete which has segregated in conveying shall not be used.

3.06 PLACING

A. Place concrete in accordance with ACI 301, Chapter 8.

B. Accomplish compaction by use of a mechanical vibrator having a frequency of not less than 8000 cps. Vibration shall not be used to flow concrete horizontally more than 2 feet.

3.07 PLACEMENT IN EXTREME WEATHER

A. Placing Concrete in Cold Weather: Do not place concrete when the atmospheric temperature is below 40 degrees F, or when the concrete is likely to be subjected to freezing temperatures within 24 hours after placement. Heat concrete as necessary to maintain a concrete temperature of between 60 and 80 degrees F when placed. Remove frozen material from aggregates before placing in the mixer.

B. Placing Concrete in Hot Weather: When the outdoor ambient temperature is over 90 degrees F or as directed by the Engineer, provide methods so the temperature of the concrete as placed shall not exceed 90 degrees F. Shade concrete after placing and start curing as soon as the surface of the fresh concrete is sufficiently hard to permit it without damage. Unless specified otherwise, the control of hot weather concreting and the methods employed to control the temperature of the material both during placing and curing operation shall be in accordance with ACI 305R, Hot Weather Concreting.

3.08 CURING AND PROTECTION

A. General: Protect concrete, including areas to be given a special finish, from damage by the sun, rain, flowing water, frost, and mechanical injury. Do not allow concrete to dry out for a minimum of seven days from the time it is placed. Provide water curing by keeping the surface of the concrete continuously wet by covering with water, with an approved water saturated covering, or by spraying. Water used for curing shall be fresh water. Where water curing is not used, provide curing by sealing the water in the concrete so that it cannot evaporate. This may be done by leaving the forms in place, covering with a waterproof curing paper laid with airtight joints, use of a curing compound, or by other approved means.

B. Do not use liquid membrane-forming curing compounds where terrazzo, hard tile or cementitious floor finish materials are to be installed. See finish schedule.

C. Apply curing compound immediately after final finishing.

D. Keep wood forms sufficiently damp to prevent drying out of the concrete.

E. Portions of the time during which either moisture or warmth is lacking shall not be counted effective for curing. When concrete is placed in cold weather, make provisions for maintaining the temperature of the air in contact with the concrete at not less than 50 degrees F for a period of not less than 7 days after placing, or at not less than 70 degrees F for a period of not less than 3 days after placing. Heating of the concrete in place shall be affected by salamanders or steam coils under canvas covers or by other approved means. Temperature within enclosures shall not exceed 100 degrees F, and apply adequate moisture during the heating period to prevent concrete from drying out. Rate of cooling after the protection period shall be approximately 1 degree F per hour for the first 23 hours and 2 degrees F per hour thereafter.

3.09 REMOVAL OF FORMS AND PROTECTION

A. General: Remove forms in a manner which will not damage the concrete. Do not remove forms for the following minimum times:

	Days after Placing
1. Side forms on beams, girders, columns, and wall (lifts 15 ft and under)	24 hours provided patching and finishing may be completed in 8 hours and the work immediately recovered with approved curing media.
2. Columns and walls (lifts over 15 ft)	5
3. Supporting forms for arches, beams, girders, and slabs	14

B. Provide sufficient shoring members to support dead load plus construction loads on beams, girders, slabs, and arches until concrete has reached the full specified strength.

C. Special Requirements for High-Early Strength Concrete: The curing periods, minimum periods during which supporting forms and shores shall be left in place, and minimum periods for maintaining curing temperatures shall be not less than one-quarter of those specified for concrete using Type 1 cement, but in no case less than 24 hours.

3.10 CONSTRUCTION JOINTS

A. General: Provide construction joints where indicated on the Drawings or as otherwise approved.

B. Prepare construction joint surfaces for placement of concrete by cleaning with compressed air and water. Remove stains and foreign material from the surface and coat with a bonding compound. Place new concrete after bonding compound has dried.

C. Where new concrete is to be bonded to existing concrete, clean existing surface and roughened thoroughly, remove loose particles, dampen surface, and apply bonding compound. Place new concrete after bonding compound has dried.

D. Where construction joints are indicated on the Drawings for slabs on grade, control joint indicated on the Drawings may be used instead. This provision does not apply when the construction joint occurs directly under CMU walls.
   1. Control Joints: Saw cut slab after concrete has hardened sufficiently to prevent dislodging of aggregate and while the temperature of the fresh concrete is still rising. Complete cutting of slabs within twenty four hours of concrete placement. Flush out joints immediately after cutting with air or water under pressure to remove sawing residue.
   2. Keep joints clean and protected from debris, grease, and oil. No earlier than thirty days after concrete placement, fill joints with a flexible epoxy joint filler and compatible back up material intended for this purpose. Prepare joint and apply filler in accordance with manufacturer's recommendations.

3.11 FINISHING CONCRETE

A. General: As soon as forms are removed, patch defective areas and fill tie holes with cement mortar of the same composition as that used in the concrete. Cut out defective areas to solid concrete but to a depth of not less than 1 inch. Edges of the cut shall be perpendicular to the surface of the concrete. Area to be patched and at least 6 inches adjacent thereto shall be dampened and apply bonding compound. Place patching mortar after bonding compound has dried. Mix mortar approximately one-half hour before placing and remix occasionally during this period with trowel without the addition of water. Compact mix into place and screed slightly higher than the surrounding surface. Finish patches on exposed surfaces to match the adjoining surfaces after they have set for a period of an hour or more. Cure patches as specified for concrete. Wet tie holes with water and fill solid with mortar. Fill holes extending through the concrete by means of a plunger type gun or other suitable device from the exposed face. Wipe excess mortar off the exposed face with a cloth. Protect finish surfaces from stains and abrasions.

B. Surface Finishes: Exposed concrete surfaces, except floors, bottom slabs, and walking surfaces, shall receive the following finish.

1. As soon as the pointing and patching has set sufficiently to permit it, thoroughly wet surface with a brush and rub with a No. 16 carborundum stone or other equally good abrasive, bringing the surface to a paste. Continue rubbing sufficiently to remove form marks and projections, producing a smooth dense surface without pits or irregularities.
2. Carefully spread or brush material, which in the above process has been ground to a paste, uniformly over the entire surface and allowed to reset. After the rubbing is complete, thoroughly drench and keep surface wet for a period of 7 days, unless otherwise directed. Obtain final finish by a thorough rubbing with a No. 30 carborundum stone or other equally good abrasive. Continue rubbing until entire surface is a smooth texture and uniform in color.
3. Adjoining or adjacent work which has been disfigured by the above specified work shall be thoroughly cleaned by approved methods so that the complete unit presents the same appearance.
4. In lieu of the procedure described in items 1, 2, and 3 above, grind all fins smooth and use a cementious type concrete coating, color as selected by the Owner. Apply cementious type concrete coating in strict accordance with the manufacturer's recommendation. Acceptable manufacturers shall be Thoroseal, Euclid Company, Old North Manufacturing Company or equal.

C. Floor and Roof Slab Finishes:
1. Finished floor and roof slab surfaces shall be true plane surfaces, with a tolerance of 1/8 inch in 10 feet unless otherwise indicated. Pitch surfaces to drains. Dusting of finish surfaces with dry materials will not be permitted.
2. Monolithic Finish: Floor and roof slabs shall be placed, consolidated, struck off and leveled to the required elevation. When the concrete has stiffened sufficiently to bear a man's weight without deep imprint, float surface, at least twice, to a uniform sandy texture. Steel trowel surface to a smooth, even, impervious finish, free from trowel marks.
3. Surface of slabs, except roof slabs, shall be given a second steel-troweling to a burnished finish.

D. Sidewalk, platform, and wearing surfaces not otherwise specified shall receive a broom finish. Slab shall receive a float finish, as indicated above, and then lightly brush surface with a hair broom to leave a slightly rough, non-slip surface. Brooming shall be done in one direction and leave a uniform neat pattern.

E. Concrete bottom slabs in channels, clarifiers, wet wells, and chlorine contact chamber shall receive a steel troweled finish. Surface shall be smooth, true to established planes and conforming to lines and slopes as indicated on the Drawings. Care shall be taken to produce a surface of maximum smoothness, and care shall be taken to protect surface from damage during later work.

3.12 FORMS

A. General: Form concrete unless specified or directed otherwise. Set forms true to line and grade within the allowable tolerances specified for finishes and shall be mortar-tight. Arrange bolts and rods used for internal ties so that when forms are removed, metal will have the minimum specified cover.

B. Where water-tightness is required, do not use bolts or rods which are withdrawn when the forms are removed. Do not use wire ties where the concrete surface will be exposed to weathering and where discoloration will be objectionable. Provide form work with adequate clean-out openings to permit inspection and easy cleaning after reinforcement has been placed. In columns, walls, and similar members of

small dimensions, the height of forms for each vertical lift shall not exceed 6 feet unless suitable openings are provided at not more than 6 foot vertical intervals to permit proper placing of the concrete. Where forms for continuous surfaces are placed in successive units, fit forms over the completed surface so as to obtain accurate alignment of the surface and to prevent leakage of mortar. Install panel forms to provide tight joints between panels. Install forms so they can be removed without damaging the concrete. Chamfer exposed joints, edges, and external corners. Forms for heavy girders and similar members shall be constructed with a camber, as directed. When placing concrete in excavations, forms shall be not less than 3 inches outside the concrete lines indicated.

C. Coating: Before placing the concrete, coat contact surfaces of forms with a non-staining mineral oil or two coats of nitrocellulose lacquer, except for unexposed surfaces when the temperature is above 40 degrees F sheathing may be wetted thoroughly with clean water. Remove excess oil by wiping with cloths. Clean contact surfaces of forms for reuse.

3.13 REINFORCING STEEL

A. General: Provide reinforcement bars, stirrups, hanger bars, wire fabric, and other reinforcing materials as indicated on the Drawings or required by the specifications together with necessary wire ties, chairs, spacers, supports, and other devices to properly install and secure the reinforcing. Reinforcement shall be free from foreign substances. Reinforcement which has bands not shown on the project drawings or on approved shop drawings or which is reduced in section by rusting shall not be used.

B. Fabricate bar mats from bars conforming to specifications for reinforcement bars and intersections shall be fastened securely by approved mechanical ties.

C. Placing: Place reinforcement accurately and thoroughly secure. Support with concrete or metal chairs, spacers, or metal hangers. Metal chairs, clips, or supports, the ends of which will be exposed on the concrete surface, will be permitted only where the surface will not be exposed to weathering and where discoloration will not be objectionable; elsewhere concrete or other approved non-corrodible material or other approved means shall be used for support.

D. Splicing: Where splices in addition to those shown on the project Drawings are necessary, lap bars as scheduled below.

BAR SIZE	LAP, INCHES	BAR SIZE	LAP, INCHES
#3	16 (18)	#7	33 (42)
#4	19 (24)	#8	39 (51)
#5	23 (30)	#9	69 (90)
#6	28 (36)	#10	88 (114)

Figures in parentheses are for top bars (horizontal reinforcement placed such that more than twelve inches of fresh concrete is cast in the member below the reinforcement). Other figures are for all other bars.

Stagger splices in alternate bars. Splices shall be in accordance with ACI 318 and ACI 301.

BAR SIZE	LAP, INCHES	BAR SIZE	LAP, INCHES
#3	16 (18)	#7	33 (42)
#4	19 (24)	#8	29 (51)

#5	23 (30)	#9	69 (90)
#6	28 (36)	#10	88 (114)

E. Protection of Reinforcement: Reinforcement of footings and other principal structural members in which the concrete is deposited on the ground shall have not less than 3 inches of concrete between the reinforcement and the ground contact surface. If concrete surfaces after removal of the forms are to be exposed to the weather or water or be in contact with the ground, the reinforcement shall be protected with not less than 2 inches of concrete for bars greater than 5/8-inch in diameter and 1-1/2 inches for bars 5/8-inch or less in diameter. Measure protective cover from the outside edge of the steel.

F. Concrete protective covering for reinforcement of surfaces not exposed directly to the ground, water, or weather shall be not less than 3/4 inch for slabs and walls and not less than 1-1/2 inch for beams, girders, and columns.

G. Do not use heat to field bend bars.

H. When required and approved in writing by the Engineer, welding of reinforcing shall conform to "Recommended Practice for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction (ANS D12.1)". No tack welding will be permitted.

3.14 SETTING MISCELLANEOUS MATERIALS

A. Pipe sleeves, wall castings, anchors and bolts, including those for machine and equipment bases, angle frames or edgings, hangers and inserts, pipe supports, conduits and other materials in connection with concrete construction, shall, where practicable, be placed and secure in position when the concrete is placed. Anchor bolts for machines and equipment shall be set according to templates, shall be carefully plumbed, checked for location and elevation with an instrument, and be held in position rigidly to prevent displacement while concrete is being placed.

3.15 TESTING

A. Field Poured Specimens:
   1. Provide one set of specimens for compressive strength tests for each 100 cubic yards, or fraction thereof, of each class of concrete, placed each day. Not less than four specimens shall be made for each test. Specimens shall be made and cured in accordance with ASTM C31. When in the opinion of the Engineer there is a possibility of the air temperature falling below 40 degrees F, additional specimens shall be taken and cured in the field under conditions similar to those of the concrete in the structure. Test specimens in accordance with ASTM C39.
      a. The standard age of specimens at test shall be 28 days. Of the four specimens made for each test, two shall be tested at 28 days for acceptance and one shall be tested at 7 days for information. The fourth specimen shall be a reserve.
      b. The strength level of the concrete will be considered satisfactory so long as the averages of all sets of three consecutive strength test results (average of two cylinders tested at 28 days) equals or exceeds the specified strength f'c and no individual strength test result falls below the specified strength f'c by more than 500 psi. When the test results do not conform to these requirements, the Engineer shall have the right to require changes in the mix design and conditions of temperature and moisture necessary to

secure the required strength.

c. Tests shall be performed by an independent laboratory as specified in Section 01450, Quality Control.

d. Test reports shall be submitted in accordance with Section 01450, Quality Control.

B. Drilled Cores:

1. Where there is a question as to the quality of the concrete in the structure, the Engineer may require additional testing in accordance with ASTM C42 for that portion of the structure where the questionable concrete has been found. If the results of these additional tests meet the requirements of the specifications, the Owner shall pay for the costs of the tests. If the results of the additional tests fail to meet the requirements of the specifications, the Contractor shall pay for the tests. Concrete failing to meet the specifications shall be removed and replaced at no additional cost to the Owner.

C. Air Entrainment shall be as specified. Test air content in accordance with AASHTO T152, T121, or T156. Test shall be at the frequency required by the Engineer.

D. Test slump plus or minus 1 inch as determined by AASHTO T119. Make test from each delivery before placing concrete. Slump tests shall be made in the presence of the Engineer's representative. Concrete not meeting the slump standards specified shall be modified, if possible, to meet the standards or shall be rejected by the Engineer's representative and removed from the project.

E. Water-bearing structures shall be watertight against water pressure which may come upon them prior to backfill. Repair imperfections. On completion of water-bearing structures, fill with water to the high water line and allow to remain filled for forty-eight (48) hours before testing for water-tightness. Repair leaks to make structures water-tight.

END OF SECTION

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SECTION 08 11 14

STANDARD STEEL DOORS

PART 1 GENERAL

1.01 SCOPE

A. This work consists of furnishing all plant, labor, material, and equipment for the installation of all steel doors shown, specified, and/or reasonably implied for a complete, first class job.

1.02 SECTION INCLUDES

A. Non-rated thermally insulated steel doors.

1.03 RELATED SECTIONS

A. Section 081115 - Standard Steel Frames

B. Section 087000 - Finish Hardware

1.04 REFERENCES

A. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.

B. ANSI/SDI-100 - Standard Steel Doors and Frames.

C. ASTM A525 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.

D. ASTM C236 - Test Method for Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot-Box.

E. Door Hardware Institute (DHI) - The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.

1.05 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Shop Drawings: Indicate door elevations, internal reinforcement, closure method, and cut-outs for glazing, louvers, and finish.

C. Product Data: Indicate door configurations, location of cut-outs for hardware reinforcement.

D. Manufacturer's Installation Instructions: Indicate special installation instructions.

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

1.06 QUALITY ASSURANCE

A. Conform to requirements of ANSI/SDI-100 and ANSI A117.1.

1.07 QUALIFICATIONS

A. Quality assurance shall be as required in Section 014500, Quality Control and the following requirements.
   1. Product manufacturer shall have a minimum of three (3) years of experience.

2. Substitutions shall be as specified in Section 016000.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site under provisions of Section 016000.

B. Accept doors on site in manufacturer's packaging. Inspect for damage.

C. Break seal on-site to permit ventilation.

1.09 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.10 COORDINATION

A. Coordinate work with door opening construction, door frame and door hardware installation.

PART 2 PRODUCTS

2.01 DOOR MANUFACTURERS

A. Pioneer Industries - Product - Flush Metal Door.

B. Steel Craft - Product - Flush Metal Door.

C. Fenestra -Product - Flush Metal Door

D. Or equal, substitutions: Under provisions of Section 01600.

2.02 DOORS

A. Exterior Doors (Non-thermally Broken): SDI-100 Grade II Model 1.

2.03 DOOR CONSTRUCTION

A. Face: Steel sheet in accordance with ANSI/SDI-100. Face sheet gauge 16 gauge.

B. Core: Polystyrene with R value of 7.7.

C. Finish: Factory primed on galvanized metal.

2.04 FABRICATION

A. Fabricate doors with hardware reinforcement welded in place.

B. Close top and bottom edge of exterior doors with flush end closure. Seal joints watertight.

C. Provide glazing components for glazing installation.

2.05 FINISH

A. Steel Sheet: Galvanized to ASTM A525 G60.

B. Primer: Baked enamel, factory applied.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify substrate conditions are acceptable for installation of the work.

B. Verify that opening sizes and tolerances are acceptable.

3.02 INSTALLATION

A. Install doors in accordance with ANSI/SDI-100 and DHI.

B. Coordinate installation of glass and glazing.

C. Install door louvers, plumb and level.

D. Coordinate installation of doors with installation of frames specified in Section 081115 Standard Steel Frame and hardware specified in Section 087000 Finish Hardware.

3.03 ERECTION TOLERANCES

A. Maximum Diagonal Distortion: 1/8 inch measured with straight edge, corner to corner.

3.04 ADJUSTING

A. Adjust work under provisions of Section 017000.

B. Adjust door for smooth and balanced door movement.

END OF SECTION

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SECTION 08 11 15

STANDARD STEEL FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-rated steel frames.

1.02 RELATED SECTIONS

A. Section 081114 - Standard Steel Doors.

B. Section 087000 - Finish Hardware.

1.03 REFERENCES

A. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.

B. ANSI/SDI-100 - Standard Steel Doors and Frames.

C. ASTM A525 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.

D. DHI - Door Hardware Institute: The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.

1.04 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Shop Drawings: Indicate frame elevations, reinforcement, and finish.

C. Product Data: Indicate frame configuration, anchor types and spacing, location of cut-outs for hardware, reinforcement.

D. Manufacturer's Installation Instructions: Indicate special installation instructions.

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

1.05 QUALITY ASSURANCE

A. Conform to requirements of ANSI/SDI-100 and ANSI A117.1.

1.06 QUALIFICATIONS

A. Quality assurance shall be as required in Section, Quality Control and the following requirements.
   1. Product manufacturer shall have a minimum of three (3) years of experience.
   2. Substitutions shall be as specified in Section 016000, Product Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site under provisions of Section 016000.

B. Accept frames on site in manufacturer's packaging. Inspect for damage.

1.08 FIELD MEASUREMENTS

A. Coordinate the work with frame opening construction, door hardware and glass installation.

1.09 COORDINATION

A. Coordinate work with frame opening construction, door and hardware installation.

PART 2 PRODUCTS

2.01 FRAME MANUFACTURERS

A. Republic: Product - Door Frame.

B. Pioneer: Product - Door Frame.

C. Steel Craft: Product - Door Frame.

D. Or equal, substitutions: Under provisions of Section 016000.

2.02 FRAMES

A. Exterior Frames: 16 gage thick material, base metal thickness.

2.03 ACCESSORIES

A. Silencers: Resilient rubber, fitted into drilled hole.

B. Removable Stops: Rolled steel channel shape, mitered corners; prepared for countersink style tamper proof screws.

C. Bituminous Coating: Fibered asphalt emulsion.

D. Primer: Zinc chromate or type to match door.

2.04 FABRICATION

A. Fabricate frames as welded unit.

B. Fabricate frames with hardware reinforcement plates welded in place.

C. Prepare frame for silencers. Provide three single silencers for single doors on strike side.

D. Fabricate frames to suit masonry wall coursing with 4 inch head member.

2.05 FINISH

A. Steel Sheet: Galvanized to ASTM A525 G60.

B. Primer: Baked enamel, factory applied.

C. Coat inside of frame profile with bituminous coating to a thickness of 1/16 inch.

PART 3 EXECUTION

3.01 EXECUTION

A. Verify substrate conditions.

B. Verify that opening sizes and tolerances are acceptable.

3.02 INSTALLATION

A. Install frames in accordance with ANSI/SDI-100 and DHI.

B. Coordinate with masonry wall construction for anchor placement.

C. Coordinate installation of frames with installation of hardware specified in Section 087000 and doors in Section 081114.

3.03 ANCHOR PLACEMENT

A. Anchors for the frames shall be provided no less than 2'-8" on center vertically. For anchoring to masonry units, they shall not be less than 3/16" steel maximum width allowed by frame and 2'-0" long, turning down 4 inches.

B. Anchors for other frames shall be painted as indicated or required. For anchoring to masonry units, anchor shall be perforated adjustable anchors of 14-gauge metal and 15-1/2 inch length.

C. Anchors in masonry shall be provided at three points of each door jamb (6 anchors to each frame).

3.04 ERECTION TOLERANCES

A. Maximum Diagonal Distortion: 1/16 inch measured with straight edges, crossed corner to corner.

END OF SECTION

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SECTION 08 33 14

OVERHEAD COILING DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Overhead coiling door, operating hardware, motor operator with auxiliary chain gear operator.

1.02 RELATED SECTIONS

A. Section 087000 - Finish hardware

1.03 REFERENCES

A. ASTM A525/A525M - Steel Sheet, Zinc-coated (Galvanized) by the Hot-Dip Process.

B. ASTM A526/A526M - Steel Sheet, Zinc-coated (Galvanized) by the Hot-Dip Process.

1.04 SYSTEM DESCRIPTION

A. Motorized door operator with auxiliary chain lift operator. Chain lift operator shall be provided with proper reduction gearing requiring 25 lb. nominal force to operate.

B. Coiling Door: Surface mounted.

1.05 DESIGN REQUIREMENTS

A. Design door assembly to withstand wind/suction load of 20 psf as calculated in accordance with the North Carolina Building Code without undue deflection or damage to door or assembly components.

B. Insulation: 3/4 inch foamed in place insulation.

1.06 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Product data: Provide general construction, component connections and details, operators, weather striping and finish colors.

C. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.

D. Manufacturer’s Instruction: Indicate installation sequence and procedures, adjustment and alignment procedures, and warranties.

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

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site under provisions of Section 016000.

B. Accept doors on site in manufacturer’s packaging. Inspect for damage.

1.08 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.09 COORDINATION

A. Coordinate work with door opening construction, door frame and door hardware installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers:
   1. Overhead Door
   2. Wayne Dalton
   3. Raynor
   4. Or equal

2.02 MATERIALS

A. Slats
   1. Interlocking, minimum 24 gauge of ASTM A526 steel, galvanized to minimum 1.25 oz/sq ft coating in accordance with ASTM A525; sandwich slat construction with insulated core of foamed-in-place CFL and HCFL-free insulation flat profile.
   2. Nominal slat size: 3 inches wide x required length.
   3. Slat Ends: Alternate slats fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
   4. Curtain Bottom: Fitted with angles galvanized to provide reinforcement and positive contact with floor in closed position.

B. Guides: 3/16 inch thick; galvanized steel conforming to ASTM A526, galvanized to minimum .25 oz/sq ft of continuous angles of profile to retain door in place with vinyl weatherstripping, mounting brackets of same metal.

C. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension.

D. Hood Enclosure: 24 gauge galvanized steel; internally reinforced to maintain rigidity and shape.

E. Lockset: Provide two (2) heavy duty roll-up door deadlock latches. (one each side of door) Lock shall work from interior and engage steel bar into track slot.

F. Weatherstripping: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain, and where curtain enters hood enclosure.

2.03 ELECTRIC MOTOR OPERATOR

A. Electric motor operator shall be of a type recommended by the door manufacturer and shall be complete with an electric motor, reduction gearing, magnetic brake, brackets, push-button controls, limit switches, magnetic reversing starters, and other accessories required for proper operation. The operator shall be designed so that the motor may be removed without disturbing the limit switch adjustment and without affecting the emergency auxiliary operators. Provisions shall be made for

immediate manual operation of the door in case of electrical failure. The emergency operating mechanism shall be arranged so that it may be placed in and out of operation from the floor, and its use shall not affect the adjustment of the limit switches. The motor shall be disconnected from the manual operating mechanism whenever the mechanism is engaged. Electric motor operators shall be wall mounted near the head of the door.

2.04 MOTORS

A. Motor shall be 1 Hp, sufficient to move door in either direction from any position and produce a travel of one foot per second maximum and 1/2 foot per second minimum when operating under full wind load conditions.

2.05 CONTROL SYSTEM

A. Door shall be equipped with an automatic control system arranged to control the opening, closing, and stopping of curtain travel, and to automatically reverse closing travel when the lower edge of the door curtain meets an obstruction. The control system shall be mounted in NEMA Type 12 enclosures.

2.06 MOTOR CONTROLLER

A. The motor controller shall be a full voltage, reversing, magnetic type with 480 volt, 60 Hz, 3 phase contactors, automatic reset thermal overload relays, 120 volt ac operating coil, and 480 to 120 volt dry type control transformers complete with one secondary lead fused and the other secondary lead grounded. Starters shall not be smaller than NEMA Size 1.

B. Three thermal overload relays shall be furnished with each motor starter and shall be rated as required to protect motors from damage due to overload.

C. The motor controller enclosure shall be sized and arranged to house the control power transformer and fuses, any relays required, and a marked terminal block on which all control wiring from all devices shall be terminated. The terminal block shall be located for ease of installation and maintenance. All control wiring shall be 14 AWG or larger.

2.07 CONTROL SWITCHES

A. Remote control switches shall be located on the interior of the openings as indicated. Each switch control station shall be of the three-button momentary contact type, with the buttons marked "Open", "Close", and "Stop". When the door is in motion and the "Stop" button is pressed, the door shall stop instantly and remain in the stopped position; from the stopped position, the door may be operated in either direction by pushing the "Open" or "Close" button. Push buttons shall be of the fullguarded type to prevent accidental operation. Exterior control switches shall be provided with a locking device operated by a special key. Limit switches shall be provided to automatically stop the doors at their fully open and fully closed positions. Limit switches shall be readily adjustable.

2.08 SAFETY DEVICE

A. The bottom edge of each electric motor operated door shall be equipped with a safety device which will immediately stop and reverse the downward travel of the door upon contact with an obstruction in the door opening. The safety device shall be arranged and connected with the closed limit switch to prevent opening of the closed door by tripping the safety device. The safety device shall not substitute for

a limit switch. Type S cable, equipped with a springloaded automatic takeup reel, or equivalent device, shall be provided between the safety device and fixed cable support.

2.09 FINISHES

A. Steel Guides, Slats and Hood Enclosure: Prime coat and finish coat shall be factory applied. Owner shall select color.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that opening sizes, tolerances and conditions are acceptable.

3.02 INSTALLATION

A. Install door unit assembly in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07900.

F. Install perimeter trim for weathertight seal.

3.03 ERECTION TOLERANCES

A. Maintain dimensional tolerances and alignment with adjacent work.

B. Maximum Variation from Plumb: 1/16 inch.

C. Maximum Variation from Level: 1/16 inch.

D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

3.04 ADJUSTING

A. Adjust door, hardware and operating assemblies for smooth and noiseless operation.

3.05 CLEANING

A. Section 017000 - Contract Closeout

B. Clean door and components.

C. Remove labels and visible markings.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

PART 1 GENERAL

1.01 SCOPE

A. This work consists of furnishing all plant, labor, materials, and equipment for the installation of all finish hardware and associated work shown, specified, and/or reasonably implied for a complete, first-class job.

1.02 GENERAL REQUIREMENTS

A. The Contractor shall furnish and install all new finish hardware necessary for proper operation of all doors.

B. The Contractor shall provide finish hardware necessary for completion and proper operation of the building.

C. Insofar as practical, finish hardware shall be the product of one manufacturer, one standard design throughout the building, regardless of manufacturers.

D. Doors for which hardware is not designated shall be provided with hardware similar to that specified for doors of similar location or function.

1.03 SCHEDULE AND SAMPLES

A. A complete schedule of all hardware showing manufacturer's catalog numbers shall be furnished to the Engineer for approval. Upon request of the Engineer, catalog cuts and descriptions or physical samples shall also be submitted.

1.04 TEMPLATES

A. Hardware for all metal doors and/or frames shall be furnished to template dimensions and with machine screws. Necessary templates and allied information shall be supplied to door and frame manufacturers in ample time to prevent delay.

1.05 PACKAGING AND IDENTIFICATION

A. Each item of hardware shall be packaged separately in individual containers, complete with screws, instructions, and installation templates required for accurate location, setting, and attachment of hardware.

B. Each container shall be identified with the number of the door to which the hardware item is to be applied, item number corresponding to the item number listed in the approved hardware schedule.

1.06 FINISHES

A. All hardware shall have US-10 finish (dull bronze), unless specified otherwise herein. Surface type door closers may have aluminum spray finish. Butts shall be primed for painting, USP finish. Exterior butts shall be bonderized and prime painted.

1.07 FASTENERS

A. Of the proper type, quality, size, quantity and finish shall be supplied with the hardware and shall match the finish of trim as closely as possible. Fasteners shall

be of the type necessary to accomplish a permanent installation. All wood screws shall be full threaded.

PART 2 PRODUCTS

2.01 HARDWARE

A. Hinges: Stanley, McKinney, Hager, or equal.

B. Pivots: Rixon, Glynn Johnson, Dor-o-matic, or equal.

C. Latch Sets: Russwin, Yale, Falcon, or equal.

D. Push/Pulls: Builders Brass, Baldwin, Quality, or equal.

E. Cylinder Locks: Russwin.

F. Mortise Locks: Russwin, Yale, Falcon, or equal.

G. Closers: Norton, LCN, Russwin, or equal.

H. Overhead Holders: Rixon, Glynn Johnson, Russwin, or equal.

I. Gasketing: Pemko, National Guard, Reese, or equal.

J. Protection Plates: Builders Brass, Baldwin, Quality, or equal.

K. Or equal, substitutions: Under provisions of Section 016000.

2.02 HINGES

A. Shall be provided for all doors with appropriate screws. Hinges shall be full mortise, average frequency standard weight meeting ANSI standards, size 4-1/2 inches for doors 36 inches wide and less. Hinges for doors with closers and fire rated doors shall be ball bearing or oil impregnated type.

2.03 DOOR CLOSURES

A. Surface Mounted, Overhead Type: Exterior doors shall have hold-open devices. Sizes shall be as recommended by the manufacturer. Each shall have the following features:
   1. Adjustable backcheck and backcheck selector.
   2. Separate regulating valves for door speed and latching speed.
   3. Versatile mounting position
   4. Adjustable spring power of a full 50%.
   5. Adjustable delayed action.
   6. Close grained, high strength cast iron case.
   7. Forged steel arms.

2.04 DOOR SILENCERS

A. On hollow metal frames for single doors, locate silencers directly opposite hinges. On frames for double doors, locate silencers on head rabbet of door frame, approximately 6 inches each side of center line of door opening

2.05 METAL DISCS

A. Shall be provided for all doors. Discs shall be brass, 3/4" in diameter, and shall be stamped with opening number as shown in the floor plans. They shall be installed on the hinge edge of doors near top.

2.06 LOCKSETS

A. Exterior door shall conform to Federal Specification FF-H-106, Series 86 and ANSI A156.2-1975 and shall have the following features:
   1. For doors 1-3/4 inches thick and over.
   2. Dead bolt brass, 3/4-inch throw, with interior turn knob.
   3. Latch bolt, anti-friction, extruded brass, with nylon insert, 5/8-inch throw.
   4. Front, stainless steel, adjustable armored with adjustment from flat to 1/8-inch in 2 inches.
   5. Case, heavy wrought steel.
   6. Strike, dull bronze, ANSI Standard A-115.1, curved lip, handed.
   7. Cylinder, brass, 6-pin tumbler
   8. Turn knobs, dull bronze. Maximum know projection 2-7/8 inches.
   9. Finish, US 10.

2.07 KICKPLATES

A. Shall be 16-gauge, US 32D finish, size 8 inches high x 2 inches less than door width. Screws shall match finish and shall be self-tapping for metal doors, countersunk, wood screws for wood doors.

2.08 TOP AND BOTTOM BOLTS

A. Shall be surface type with plunger to keeper in threshold or head mullion. Prime coated steel.

2.09 THRESHOLDS

A. Exterior doors shall be provided with 4-inch wide, interlocking type, bronze thresholds with non-skid surface. Provide matching hook strip for bottom of door to interlock with threshold lip.

B. Provide interlocking type bronze weatherstrip for mounting to jambs and head by means of No. 4 x 1/2 inch SM screws.

2.10 KEYING

A. All doors shall be keyed to a master key. Coordinate with the Owner. Furnish two sets of keys.

PART 3 EXECUTION

3.01 INSTALLATION OF HARDWARE

A. All hardware shall be installed in a neat, workmanlike manner, following manufacturer's instructions. Except as indicated or specified otherwise, fastener's furnished with the hardware shall be used to fasten hardware in place. Fasten hardware to wood surfaces with full-threaded wood screws or sheet metal screws. Use machine screws set in expansion shield for fastening hardware to solid concrete and masonry surfaces. Use toggle bolts where required for fastening to hollow core construction. Use through bolts where indicated or specified and where necessary for satisfactory installation.

B. After installation, protect hardware from paint, stains, blemishes and other damage until acceptance of the work. All hardware shall be adjusted properly and checked in the presence of the Engineer, and all hinges, locks, latches, bolts, holders, closers

and other items shall operate properly. After hardware is checked, keys shall be delivered to the Engineer. All errors in cutting and fitting and all damage to adjoining work shall be corrected, repaired and finished as directed.

3.02 LOCATION OF HARDWARE

A. Locks: Knobs shall be located so that the centerline of the stroke is 40 inches (nominal) above the finished floor.

B. Deadlocks shall be mounted so that the centerline of the cylinder and strike is 60 inches (nominal) above the finished floor. Deadlocks shall not be mounted in conjunction with push and pull plates.

C. Hinges shall be located as follows:
   1. Top Hinge: Not over 11-1/3 inches from the inside of frame rabbet at head to center of hinge.
   2. Bottom Hinge: Not over 13 inches from finished floor to centerline of hinge.
   3. Center Hinge: Midway between top and bottom hinges.

D. Door silencers: On hollow metal frames for single doors, locate silencers directly opposite hinges. On frames for double doors, locate silencers on head rabbet of door frame, approximately 6 inches each side of centerline of door opening.

E. Top and bottom bolts shall be provided on the inactive leaf of each pair of doors.

3.03 HARDWARE SETS

A. The following sets and symbols correspond to standard hardware set numbers. Where a set of hardware for single door is shown at pair of doors, equip each leaf of the pair with set noted. Should any item or part of item be omitted from this itemized listing which would prevent the proper operation of the complete set or operation of the door, the Contractor shall be expected to provide the necessary item.
   1. HW-1 (Utilize for all exterior hollow metal doors shown on the Drawings)
      a. 3 - Butt Hinges 4-1/2 x 4-1/2
      b. 1 – Lockset
      c. 1 – Lockguard (exterior doors only)
      d. 1 - Parallel arm closer/stop
      e. 1 - Kick Plate 8" x 2" less than door width
      f. 1 - Threshold (Bronze)
      g. 1 - Set weather stripping 305BR (Bronze) head and jambs
      h. 3 – Silencers
      i. 1 – Astragal (double doors only)
      j. 1 – Top and Bottom Bolts (double doors only)
      k. 1 - Metal disc 3/4: diameter

B. Adjust hardware for smooth operation.

3.04 UPON COMPLETION AND BEFORE ACCEPTANCE OF WORK

A. The Contractor shall demonstrate each door to show that all functions are properly installed and operating. Hardware shall be left clean and bright, and two keys for each lock cylinder shall be turned over to the Owner.

END OF SECTION

SECTION 09 97 14

ELEVATED WATER TANK, COATING

PART 1 GENERAL

1.01 SCOPE

A. Work shall include, but not be limited to, the following major items and necessary accessories for the painting of the elevated water tank in accordance with AWWA D102 and this specification.
   1. Interior
      a. Surface Preparation.
      b. Coating system.
   2. Exterior
      a. Surface Preparation.
      b. Coating system.
      c. Logo and name.

1.02 RELATED SECTIONS

A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
   1. Section 33 01 02, Disinfection of Potable Water Systems
   2. Section 33 16 10, Elevated Water Tank

1.03 REFERENCE STANDARDS

A. 29 CFR 1910 - Occupational Safety and Health Standards; Current Edition.

B. 29 CFR 1910.134 - Respiratory protection; Current Edition.

C. 29 CFR 1910.146 - Permit-Required Confined Spaces; Current Edition.

D. 29 CFR 1926 - Safety and Health Regulations for Construction; Current Edition.

E. AWWA D102 - Coating Steel Water-Storage Tanks; 2021.

F. NSF 61 - Drinking Water System Components - Health Effects; 2023, with Errata.

G. NSF 600 - Health Effects Evaluation and Criteria for Chemicals in Drinking Water; 2021, with Addendum.

H. SSPC V1 (PM1) - Good Painting Practice: Painting Manual Volume 1; 2016.

I. SSPC V2 (PM2) - Systems and Specifications: Steel Structures Painting Manual Volume 2; 2021.

J. SSPC-SP 6/NACE No.3 - Commercial Blast Cleaning; 2006.

K. SSPC-SP 10/NACE No.2 - Near-White Metal Wet Abrasive Blast Cleaning; 2006.

1.04 DEFINITIONS

A. Contractor shall be considered the hazardous waste generator for materials associated with new painting.

1.05 SUBMITTALS

A. Submit the following in accordance with Section, Submittal Procedures:

B. Affidavit of Compliance: Affidavit shall attest that supplied products conform to the referenced standard and this specification and that all tests set forth in each applicable referenced publication have been performed and that all test requirements have been met. Submit for each of the following materials:
   1. Each type of paint.

C. Certification: Provide a letter at the end of the Project certifying the following actual work dates and that the cure time for each coat complied with the manufacturer's requirements.
   1. Start and completion dates for each paint coat.
   2. Date the tank was chlorinated.
   3. Date the tank was filled
   4. Date the tank was placed into service.

D. Catalog Data: Submit manufacturer's standard drawings or catalog cuts for the following. The equipment to be furnished for the Project shall be clearly indicated including all options to be provided.
   1. Paint Schedule: Submit five (5) copies of the manufacturer's data sheet for each type of paint. The data sheet shall include, but not be limited to, the following:
      a. Paint system.
      b. Requirements for the following:
         1) Handling and storage.
         2) Health and safety.
         3) Surface preparation.
         4) Application.
         5) Curing time between coats and for immersion.
      c. Certification by NSF, International in accordance with NSF Std. 61 for interior paint systems.
      d. Recommended Dry Film Thickness (DFT).

E. Samples: Submit five (5) color cards with paint schedule submittal (exterior only).

F. Worker Protection
   1. Respiratory Protection: Submit a respiratory protection plan in accordance with 29 CFR 1910.134. Submittal shall be made not less than 30 days before construction.
   2. Personal Hygiene: Provide a written description of personal hygiene facilities, practices, and protective clothing controls. Submittal shall be made not less than 30 days before construction.
   3. Confined Space Entry: Provide a written confined space entry program indicating permitting procedures and required training programs as outlined in 29 CFR 1910.146.

1.06 QUALITY ASSURANCE

A. Follow requirements in Section 01 45 00 Quality Control

B. Contractor shall have a minimum of five (5) years experience in painting of elevated water tanks with a minimum of three (3) projects completed similar to Work specified herein. Upon request provide documentation of elevated tank painting experience.

C. Provide standard products of Carboline, Sherwin Williams, Co., TNEMEC, or equal. Paints used shall be of one manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Follow requirements in Section 01 60 00 Product Requirements.

1.08 PROJECT CONDITIONS

A. Elevated water tank interior is considered a confined space hazard. Provide written proof of training and compliance with 29 CFR 1910.146. Only personnel trained in confined space entry may enter the tank.

B. Prevent damage to adjacent property.

1.09 WARRANTY

A. Coating color and gloss warrenty coverage shall be effective for a period of fifteen (15) years beginning on the substantial completion date or beginning six (6) months following commencentment of painting, whichever comes first.

B. Coating change color shall not be more than 5 DE Hunter as determined in accordance with ASTM D2244 by comparing the affected exposed coating cleaned with water and a soft cloth with unexposed original original project color standards maintained by paint manufacturer and the Owner.

C. The exterior finish shall be not exhibit loss of gloss in excess of 24 units as measured by a gloss meter in accordance with ASTM D523-89 with 60 degree geometry.

D. Anniversary Inspection
   1. Tank shall be inspected by Engineer and Contractor at approximately one year after acceptance of Work, to determine whether any repair work is necessary.
   2. Owner shall establish the date for the inspection and notify Contractor at least 30 days in advance. If no inspection date has been set by the end of 13 months after completion of the work, the anniversary inspection shall be considered waived.
   3. Owner shall drain the tank if required and allow access to the tank. Contractor shall provide equipment required for the inspection.
   4. Peeling, bubbling, blistering, cracking or rusting shall be considered a failure of the paint system. Make repairs removing the deteriorated coating, cleaning and spot painting with the same paint system. Remove entire paint system when failure area exceeds 15 percent on the roof, floor or shell and repaint area as specified herein at no cost to the Owner.

1.10 PROJECT SCHEDULING

A. Coordinate painting of tank with Owner and Engineer. Owner shall have a minimum of 48 hours notice before the following:
   1. Applying paint. Engineer must inspect surface preparation and each paint coat before Contractor may proceed with the next coat.
   2. Filling of tank.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cleaners, thinners, driers, and other additives and surface treatment materials shall be those approved for use by the manufacturer of the paints.

B. Products used for tank interior shall be approved by the North Carolina Division of Health Services and certified in accordance with NSF 61/NSF 600 for use inside potable water tanks.

2.02 CAULK

A. Provide a modified polyurethane compound for caulking, Tnemec series 264, Elasto-Shield or approved substitute.

2.03 PAINT SCHEDULE

A. Paint shall be of one manufacturer. Paint systems are specified based on the AWWA D102 coating system number. The corresponding manufacturer's system for Sherwin-Williams and Tnemec are provided as a reference.

B. Mil thickness indicated is for the minimum dry film thickness (mdft).

C. Inside Wet Surface Areas: Inside Coating System No. 5 (ICS-5): Work shall including underneath side of tank bowl in the dry riser portion. Three-coat system: organic zinc-rich primer and intermediate and finish coats of two-component epoxy.
   1. Shop Prime Coat: NSF Zinc Rich Aromatic Urethane applied at 2.5 – 3.5 dry mils.
      a. Sherwin-Williams: CorothaneGalvapac 1K
      b. Tnemec: Series 91-H20 Tnemec-Zinc
   2. Stripe Coat: NSF Polyamidoamine Epoxy applied at 4.0 – 6.0 dry mils
      a. Sherwin-Williams: Sherplate 600
      b. Tnemec: Series N140 Pota-Pox Plus
   3. 1st Field Coat: NSF Phenalkamine Epoxy applied at 4.0 – 6.0 dry mils
      a. Sherwin-Williams: Sherplate 600
      b. Tnemec: Series 21 Epoxoline
   4. 2nd Field Coat: NSF Phenalkamine Epoxy applied at 4.0 – 6.0 dry mils
      a. Sherwin-Williams: Sherplate 600
      b. Tnemec: Series 21 Epoxoline

D. Inside Dry Surface Areas: Coating System No. 5 (ICS-5): Dry interior areas in the riser where the NSF 600 is not required in bell and riser shaft.
   1. Shop Prime Coat: NSF Zinc Rich Aromatic Urethane applied at 2.5 – 3.5 dry mils.
      a. Sherwin-Williams: CorothaneGalvapac 1K
      b. Tnemec: Series 91-H20 Tnemec-Zinc
   2. Stripe Coat: NSF Polyamidoamine Epoxy applied at 4.0 – 6.0 dry mils
      a. Sherwin-Williams: Sherplate 600
      b. Tnemec: Series N140 Pota-Pox Plus
   3. 1st Field Coat: NSF Phenalkamine Epoxy or Polyamidoamine Epoxy applied at 4.0 – 6.0 dry mils
      a. Sherwin-Williams: Sherplate 600
      b. Tnemec: Series 21 Epoxoline or Series N140 Pota-Pox Plus
   4. 2nd Field Coat: NSF Phenalkamine Epoxy or Polyamidoamine Epoxy applied at 4.0 – 6.0 dry mils
      a. Sherwin-Williams: Sherplate 600
      b. Tnemec: Series 21 Epoxolineor or Series N140 Pota-Pox Plus

E. Outside Surface Areas: Outside Coating System No. 4 (OCS-4): Work shall include the entire exterior of the tank. Three-coat system: organic zinc-rich primer and intermediate coat of an aliphatic polyurethane and finish coat of two-component

aliphatic fluorourethane.

1. Shop Prime Coat: NSF Zinc Rich Aromatic Urethane applied at 2.5 – 3.5 dry mils.
   a. Sherwin-Williams: CorothaneGalvapac 1K
   b. Tnemec: Series 91-H20 Hydro-Zinc
2. Stripe Coat: Polyamidoamine Epoxy applied at 4.0 – 6.0 dry mils
   a. Sherwin-Williams: Macropoxy 646 Fast Cure
   b. Tnemec: Series N69 Hi-Build Epoxoline II
3. 1st Field Coat: Aliphatic Acrylic Polyurethane applied at 2.0 – 3.0 dry mils
   a. Sherwin-Williams: Hi Solids Polyurethane 250
   b. Tnemec: Series 1095 Endura Shield
4. 2nd Field Coat: Advanced Thermoset Solution Fluoropolymer applied at 2.0 – 3.0 dry mils
   a. Sherwin-Williams: Flurokem HS 100
   b. Tnemec: Series 700 Hydro-Flon

F. Lettering / Logo: Two coats of an Advanced Thermoset Solution Fluoropolymer shall be used for the lettering/ logo applied at a dry film thickness of 2.0 – 3.0 per coat.
   1. Sherwin-Williams: Flurokem HS 100
   2. Tnemec: Series 700-color HydroFlon

PART 3 EXECUTION

3.01 WORKER PROTECTION

A. Conform to OSHA requirements as outlined in 29 CFR 1926 or the latest requirements for “Construction”.

B. Submit a worker protection plan indicating steps taken to limit worker exposure.

3.02 GENERAL REQUIREMENTS

A. Existing valves shall only be operated by the Owner's personnel.

B. Obtain Engineer’s written approval of surface preparation and each paint coat before proceeding with the next coat. Approval will not relieve the contractor of his obligations under the contract.

C. Owner shall select colors.

D. Finish surfaces shall be smooth, even and free of defects prior to painting.

E. Protect nameplates, tags, and signs from covering with paint.

F. Retouch damaged painting before applying the succeeding coat.

G. Prime bare surfaces prior to painting.

H. Apply number of paint coats specified in addition to spot priming.

I. Handle, prepare and apply paints in strict accordance with the manufacturer's directions.

J. Work paint materials into joints, crevices, and open spaces.

K. Measure specified paint thicknesses by dry film thickness.

L. Protect exposed concrete from paint.

M. Tank paint and coatings shall be applied on the ground. Application of coatings and paint shall not be applied in the air without Owner permission.

N. Protect Owner's and adjacent property from damage including, but not limited, paint overspray. Repair property damage to the owner's satisfaction.

O. Record environmental conditions thirty minutes before painting beings and every hour during painting operations.

P. Ensure that surface and ambient conditions are in accordance with the manufacturer's instructions immediately prior to and during application and for the period of curing. Do no apply paint when the surrounding air temperature as measured in the shade is above or below the manufacturer's specifications. Do no apply paint when the temperature of the surface to be painted is below manufacturer's recommended application temperature. Painting shall not be applied to wet or damp surfaces or when the ambient temperature is less than 5 degrees above the dew point.

3.03 SURFACE PREPARATION

A. Prepare welded seams, abraded spots, and areas not shop primed in accordance with the paint manufacturer's recommendations and the following:
   1. Exterior Surface: SSPC-SP 6/NACE No.3, 1.5-2.0 mil surface profile
   2. Interior Surface: SSPC-SP 10/NACE No.2, 2.0-3.0 mil surface profile

B. Provide a light wash of interior and exterior. Perform light wash with hot water at 2,000 psi.

C. If rust appears as a result of delay in primer application the surface shall be reblasted to specified surface preparation.

D. If the tank sits for any length of time between coats, a light wash may be required by the Engineer. Perform light wash with hot water at 2,000 psi.

3.04 JOINTS

A. Caulk overlap and butt joints that do not have continuous weld joints.

3.05 PAINTING

A. Allow for inspection of the surface preparation by the Engineer before each paint coat.

B. Apply prime coat of paint before visible rusting takes place and within 8 hours of completion of surface preparation.

C. Surface shall be free of deleterious material prior to application of paint.

D. Apply brush coat of intermediate paint on the tank seams at a dry film thickness of 4.0 mils minimum. This coat will be in addition to mil thickness for the individual specified paint coats.

E. Apply paint system at the mil thickness as specified in Part 2, Products, and in accordance with manufacturer's recommendations. Ensure that surface and ambient conditions are in accordance with manufacturer's instructions during paint application and curing period.

F. Apply logos and name on the side of the tank as directed by the Owner. Paint lettering / logo in an Owner selected contrasting color on two sides of the tank.

3.06 INSPECTION

A. Provide appropriate respiration protection, and protective clothing for the exclusive use of the engineer and inspector. Protective clothing and respirators shall be appropriate for the level of exposure indicated by current ambient air monitoring.

B. Coating shall have a uniform appearance and free of runs and skipped areas.

C. Provide a gauge for checking the film thickness. Allow for a curing time of 24 hours. Check coating thickness with a dry film thickness gauge of the magnetic type operated electrically or by permanent magnet. Calibrate gauges with a standard which is approximately the same thickness as the coating to be measured and, if possible, on metal identical both in composition and surface texture to that underlying the coating. Tolerances to be in accordance with SSPC-PA 2 Measurement of Dry Coating Thickness with Magnetic Gauges.

D. Provide a holiday detector for checking for pinholes and holidays. The last interior coat of paint shall be tested with an approved low-voltage wet sponge holiday detector. Holiday detection shall be provided only for nonmetallic(nonconductive) interior paint systems. When the final topcoat is a conductive coating the next to last interior coat shall be tested.

E. Maintain rigging and scaffolding in place until the surfaces for which it was erected are inspected and accepted by Engineer. Erect rigging and scaffolding to provide access to areas of the tank Engineer may wish to inspect.

3.07 CLEAN UP

A. On completion of work, clean paint and other material from surfaces not intended for painting.

B. Cleanup at the end of each day and leave site in a clean orderly state. Trash may be kept on site for final disposal at the Project completion provided it is kept out of sight and generates no offensive odors. Upon completion of the Work properly dispose of waste materials. Leave site in a clean condition, acceptable to Owner.

C. Restore grass and repair damage to the site caused by the Work.

3.08 DISINFECTION

A. Provide cure time for paint in accordance with manufacturer's instructions prior to immersion. Provide letter to Engineer indicating the last date of paint application for the interior and the date of tank filling.

B. Flush tank of foreign material.

C. Disinfect the tank in accordance with Section, 33 01 02, Disinfection of Potable Water System.

END OF SECTION

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SECTION 26 05 00.03

GENERAL PROVISIONS RELATED TO ELECTRICAL

PART 1 GENERAL

1.01 SCOPE

A. The Contractor shall furnish all labor, materials, tools, and equipment, and perform all work and services necessary for, or incidental, to the furnishing and installation of all electrical work as shown on the Drawings, and as specified in accordance with the provisions of the Contract Documents and completely coordinate with the work of other trades involved in the general construction. Although such work is not specifically shown or specified, all supplementary or miscellaneous items, appurtenances, and devices incidental to or necessary for a sound, secure, and complete installation shall be furnished and installed as part of this work. The Contractor shall obtain approved Shop Drawings showing wiring diagrams, connection diagrams, roughing-in and hook up details for all equipment and comply therewith. All electrical work shall be complete and left in operating condition in accordance with the intent of the Drawings and the Specifications for the electrical work.

B. Where the word "Contractor" appears in these Technical Specifications it shall be construed to mean the Electrical Contractor.

C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL INTERCONNECTING DEVICES, CONDUIT, WIRE, AND APPURTENANCES NOT FURNISHED BY OTHERS BUT REQUIRED FOR THE OPERATION OF EQUIPMENT AS DESCRIBED IN THE FUNCTIONAL DESCRIPTIONS WHETHER SPECIFICALLY SHOWN ON THE DRAWINGS OR NOT.

D. The scope of work for this project primarily includes, but is not limited to, the following:
   1. Furnish and installation of new low voltage power distribution equipment.
   2. Furnish and install power panelboards, lighting panelboards, dry-type transformers, and other low voltage electrical power distribution equipment.
   3. Furnish and install all aboveground raceway systems including conduit, fittings, boxes, and other pertinent components.
   4. Furnish and install all underground raceway systems including conduit, fittings, manholes, handholes and other pertinent components.
   5. Furnish and install all low voltage wire and cable resulting in a complete and operable electrical system.
   6. Furnish and install new lighting systems and wiring devices.
   7. Perform electrical equipment tests and provide equipment operation training as specified herein.
   8. Coordinate the installation of the new utility services with the electric utility.
   9. Other electrical work as specified herein and indicated on the Drawings.

E. All electrical equipment shall conform to the applicable NEMA specifications. All electrical equipment shall be properly identified in accordance with these Specifications and Contract Drawings. All panelboards, starters, control panels, cabinet enclosures, junction boxes, pull boxes, and equipment switches shall be identified per the requirements of Section 16075 – Electrical Identification.

F. All materials, equipment, sizes and capacities of electrical equipment incorporated in the project shall conform to the latest requirements of the current National Electric Code, the National Electrical Manufacturer's Association, the State and local electrical codes, and to applicable rules and regulations of the local electrical utility serving the project.

G. All material and equipment must be the product of an established, reputable, and approved manufacturer; must be new and of first class construction; must be designed and guaranteed to perform the service required; and must bear the label of approval of the Underwriters Laboratories, Inc., where such approval is available for the product of the listed manufacturer as approved by the Engineer.

H. When a specified or indicated item has been superseded or is no longer available, the manufacturer's latest equivalent type or model of material or equipment as approved by the Engineer shall be furnished and installed at no additional cost to the Owner.

I. Where the Contractor's selection of equipment of specified manufacturers or additionally approved manufacturers requires changes or additions to the system design, the Contractor shall be responsible in all respects for the modifications to all system designs, subject to approval of the Engineer. The Contractor's bid shall include all costs for all work of the Contract for all trades made necessary by such changes, additions or modifications or resulting from any approved substitution.

J. Furnish and install controls for each piece of equipment requiring controls under this Contract. The controls shall be the size and type recommended by the manufacturer for the application and as otherwise specified or indicated on the Drawings. Refer to Divisions 1 and 13 of the Specifications for control, connection and coordination descriptions and requirements.

K. Furnish and install all stands, racks, brackets, supports, and similar equipment required to properly serve the equipment which is furnished under this Contract, or equipment otherwise specified or indicated on the Drawings.

1.02 DEFINITIONS

A. Where the following terms are used in this Division of the specifications and on the Electrical Drawings, meanings are as indicated.

B. Provide: Furnish and install.

C. Furnish: Acquire and make available devices or equipment for installation by others.

D. Install: Install devices or equipment furnished by others.

E. Wherever the words “Approved” and “Approved Equal” appear, it is intended that items other than the model numbers specified shall be subject to the approval of the Engineer.

F. Panelboard, switchboard, and motor control center space designations:
   1. Blank: Not intended for use; plate only.
   2. Space: Contains necessary bus and hardware for future addition of circuit breakers or starters within size range.
   3. Spare: Contains a complete circuit breaker or starter installed, size as indicated for future use.
   4. Electrical Contractor: Electrical subcontractor.

1.03 COORDINATION OF WORK

A. Electrical work is included in the General Contract. It is the responsibility of the General Contractor to provide the coordination of electrical work with the electrical sub-contractor.

1.04 FEES, PERMITS, AND INSPECTIONS

A. Electrical Contractor shall obtain permits and arrange for the inspections necessary for the installation of the electrical work and furnish the Engineer with certificates of inspection from authorities having jurisdiction.

B. Inspections and tests shall be made upon formal notice to the Engineer from the Contractor sufficiently in advance to allow a representative of the Engineer to be present for each test.

C. No construction shall be covered up or concealed until it has been inspected or approved. Furnish material, labor, fuel, equipment and apparatus for tests as specified for the work.

D. Make final inspection and tests in the presence of the Engineer and Owner. Make tests under conditions simulating as nearly as practicable, those which will be obtained in operation and which show conclusively that the requirements of the specifications have been fulfilled. Provide instruments required for the tests.

1.05 CODES AND STANDARDS

A. Conformance
   1. All work, equipment and materials furnished shall conform with the existing rules, requirements and specifications of the Insurance Rating Organization having jurisdiction, the serving electrical utility company, the latest edition of the National Electrical Code (NEC), the National Electric Manufacturers Association (NEMA), the Institute of Electrical and Electronic Engineers (IEEE), the Insulated Cable Engineers Association (ICEA), the American Society of Testing Materials (ASTM), the American National Standards Institute (ANSI), the requirements of the Occupational Safety Hazards Act (OSHA), and all other applicable Federal, State and local laws and/or ordinances.
   2. All material and equipment shall bear the inspection labels of Underwriters Laboratories, Inc., if the material and equipment is of the class inspected by said laboratories.
   3. All work shall be in accordance with local codes.

B. Nonconformance
   1. Any paragraph of requirements in these Specifications, or Drawings, deviating from the rules, requirements and Specifications of the above organizations shall be invalid and their (the above organizations) requirements shall hold precedent thereto. The Contractor shall be held responsible for adherence to all rules, requirements and specifications as set forth above. Any additional work or material necessary for adherence will not be allowed as an extra, but shall be included in the Bid. Ignorance of any rule, requirement, or Specification shall not be allowed as an excuse for nonconformity. Acceptance by the Engineer does not relieve the Contractor from the expense involved for the correction of any errors which may exist in the drawings submitted or in the satisfactory operation of any equipment.

C. Certification

1. Upon completion of the work, the Contractor shall obtain certificate(s) of inspection and approval from the National Board of Fire Underwriters or similar inspection organization having jurisdiction and shall deliver same to the Engineer and the Owner.

1.06 DRAWINGS

A. The Contractor shall furnish, install, and place in satisfactory condition ready for operation, all conduits, cables, and all other material needed for the complete lighting, power, control and other electrical systems shown or indicated in the Contract Drawings. Additional conduits and the required wiring shall be installed by the Contractor wherever needed to complete the installation of the specific equipment furnished.

1.07 EQUIPMENT LOCATION

A. The Drawings show the general location of feeders, transformers, outlets, conduits, and circuit arrangements. Because of the small scale of the Drawings, it is not possible to indicate all of the details involved. The Contractor shall carefully investigate the structural and finish conditions affecting all of his work and shall arrange such work accordingly; furnishing such fittings, junction boxes, and accessories as may be required to meet such conditions. The Contractor shall refer to the entire Drawing set to verify openings, special surfaces, and location of other equipment, or other special equipment prior to roughing-in for panels, switches, and other outlets. The Contractor shall verify all equipment dimensions to insure that proposed equipment will fit properly in spaces indicated.

PART 2 PRODUCTS

2.01 EQUIPMENT AND MATERIAL

A. Equipment and material of the same general type shall be of the same make throughout the work to provide uniform appearance, operation and maintenance.

B. Equipment and material shall be new and shall bear the manufacturer's name or trade name.

C. All materials and equipment shall be labeled or listed by Underwriters' Laboratories or other North Carolina approved testing agency.

D. Where a product is specified by brand name and catalog number, and only one such product is listed, the product shall note the quality standard of product desired. Bidders are not restricted to the specific product listed. The information is used only to set forth and convey the general style, type, character, and quality of product desired. Equivalent products may be submitted to the Engineer for approval. However when three or more products are listed by catalog number, one of the listed products shall be used. Similarly, where three or more manufacturers are listed for a type of product and no catalog number is given, but a descriptive specification is provided, a product of one of the listed manufacturers meeting the specification shall be used.

2.02 DIMENSIONS

A. Ensure that items of equipment furnished fit the space available. Make necessary field measurements to ascertain space requirements, including connections. Provide such sizes and shapes of equipment that the final installation shall suit the true

intent and meaning of the drawings and specifications.

2.03 MANUFACTURER'S DIRECTIONS

A. Follow manufacturer’s directions for the delivery, storage, protection, and installation of equipment and materials. Notify Engineer in writing of conflicts between the requirements of the contract documents and manufacturer's directions. Obtain the Engineer's written instructions before proceeding with the work. Correct deficiencies in work that does not comply with the manufacturer's directions or written instructions from the Engineer.

2.04 EQUIPMENT ACCESSORIES

A. Provide equipment, accessories, connections, and incidental items necessary to fully complete the work, ready for use, occupancy and operation by the Owner.

2.05 SELECTIVE COORDINATION

A. All overcurrent devices shall be selectively coordinated with all supply-side overcurrent protective devices as required by 2011 National Electric Code, Article 701.27 for legally required systems.

2.06 CONCRETE

A. The Contractor shall furnish all concrete required for the installation of all electrical work, Concrete shall be Class A unless otherwise specified. Concrete and reinforcing steel shall meet the appropriate requirements of Division 3 of the Specifications.

B. The Contractor shall provide concrete equipment pads for all free standing electrical apparatus and equipment located on new or existing floors or slabs. The Contractor shall provide all necessary anchor bolts, channel iron sills, and other materials as required. The exact location and dimensions shall be coordinated for each piece of equipment well in advance of the scheduled placing of these pads. Equipment pads shall be 4 inches high unless otherwise indicated on the Drawings and shall conform to standard detail for equipment pads shown on the Contract Drawings. Equipment pads shall not have more than 3” excess concrete beyond the edges of the equipment.

C. The Contractor shall provide concrete foundations for all free standing electrical apparatus and equipment located outdoors or where floors or slabs do not exist and/or are not or provided by others under this Contract. The Contractor shall provide all necessary anchor bolts, channel iron sills, and other materials as required. The location and dimensions shall be coordinated for each piece of equipment well in advance of the scheduled placing of the foundations. Equipment foundations shall be constructed as detailed on the Drawings or if not detailed on the Drawings shall be 4 inches thick minimum reinforced with #4 bars at 12-inch centers each way placed mid-depth. Concrete shall extend 6 inches minimum beyond the extreme of the equipment base and be placed on a compacted stone bed (#57 stone or ABC) 6 inches thick minimum.

2.07 CABINETS AND ENCLOSURES

A. Ratings
   1. Unless specified otherwise in these Specifications or shown on the Drawings, cabinets and enclosures shall be:

a. NEMA 1A (gasketed) when located in environmentally controlled spaces such as control rooms, electric rooms, and similar locations.
b. NEMA 12 when located in dry, indoor process areas.
c. NEMA 4X stainless steel when located in damp/wet, indoor, or corrosive process areas.
d. NEMA 4X stainless steel for all outdoor locations.

B. Construction – Steel
1. Enclosures shall be fabricated from 14 gauge steel with seams that are continuously welded. Doors shall have full length piano hinges with the door removable by pulling the hinge pin.
2. A rolled lip shall be provided around three sides of the door and around all sides of the enclosure opening. The gasket shall be attached with oil-resistant adhesive and held in place with steel retaining strips. Exterior hardware, such as clamps, screws, and hinge pins, shall be stainless steel. Door latches for NEMA 4X cabinets and enclosures shall be all stainless steel, fast operating clamp assemblies that do not require bolts or screws to secure. A hasp and staple shall be provided for padlocking. Interior panels shall be provided. Each enclosure shall have a print pocket.
3. NEMA 1A and 12 enclosure finish shall be white enamel interior, light grey enamel, ANSI 61 exterior, over phosphatized surfaces. Interior panels shall be white enamel. Special finishes and colors shall be furnished as required.
4. NEMA 4X enclosures and enclosures suitable for hazardous locations shall be unpainted.

2.08 RUBBER INSULATING MATTING

A. Rubber insulating matting shall be furnished and installed on the floor and in front of each piece of electrical equipment that is located indoors and installed under this Contract. Rubber insulating matting shall not be installed outdoors. The mat shall be long enough to cover the full length of the equipment. The mat shall be 1/4 inch thick with beveled edges, canvas back, solid type with corrugations running the entire length of the mat. The matting shall meet OSHA requirements and the requirements of ASTM D-178 for Type 2, Class 2 insulating matting. Matting shall be 36 inches wide, minimum. However, matting width shall be no less than the NEC working clearance for the equipment with which it is associated.

B. Matting shall be provided for the following equipment:
1. PLC/RTU Enclosures
2. Panelboards
3. Automatic Transfer Switches
4. Generator Output Circuit Breakers

PART 3 EXECUTION

3.01 SUPERVISION

A. Provide a competent foreman to be in charge of the construction. Foreman shall have extensive experience in the work to be performed.

3.02 MATERIALS AND WORKMANSHIP

A. Materials and workmanship shall comply with applicable codes, specifications, state and local ordinances, industry standards, and utility company regulations. Damage or defects developing before acceptance of the work shall be repaired or replaced.

3.03 LOCATION OF CONDUIT, FIXTURES, EQUIPMENT, AND APPURTENANCES

A. Locations shall be adjusted to accommodate the work to interferences anticipated and encountered.

3.04 STRUCTURE AND FINISHES

A. Protect structure and finishes. Repair damage incurred.

3.05 SUPPORTS

A. Support plumb, rigid, and true to line work and equipment installed under this contract. Thoroughly study Drawings; shop drawings; catalog data; and manufacturer's installation instructions to determine how equipment, accessories, fixtures, and related items are to be supported, mounted, or suspended. Provide bolts, inserts, brackets, structural supports, and accessories for proper support whether or not shown on the drawings.

3.06 COORDINATION

A. Electrical Contractor shall provide service to General Contractor provided equipment as indicated on the Drawings. The General Contractor shall be consulted concerning coordination of service to his equipment. Electrical Contractor shall provide control wiring as indicated on the plans and specifications or as otherwise required for a complete and fully operational system.

3.07 PAINTING

A. Any electrical equipment which has its factory paint coat scratched or otherwise damaged shall be refinished with the same quality of paint and workmanship as used by the manufacturer.

3.08 CLEAN-UP

A. Clean electrical equipment, fixtures, and wiring device covers with cleaning material appropriate to the surface and material being cleaned.

B. Clean bottoms of equipment enclosures to remove metal filings and other debris.

C. Remove from the site all debris, crating, waste material, tools, temporary facilities, construction equipment, machinery, and surplus materials.

END OF SECTION

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SECTION 26 05 14

UNDERGROUND ELECTRICAL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Duct system

B. Electric manholes

C. Electric handholes

1.02 RELATED SECTIONS

A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
   1. Trenching for Utilities
   2. Cast-In-Place Concrete
   3. Conduit

1.03 REFERENCED STANDARDS

A. The latest revision, at the time of bidding, of the publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
   1. ANSI/NFPA 70 - National Electrical Code.
   2. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
   3. NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
   4. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

1.04 SUBMITTALS

A. Submit the following in accordance with Division 1.
   1. Catalog Data: Submit manufacturer's standard drawings or catalog cuts for the following:
      a. Each underground conduit types.
   2. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation.

1.05 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division 1.

B. Accurately record actual locations of exact routing of duct bank.

1.06 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this Section with minimum three years' experience.

1.07 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. or other testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle Products to site under provisions of Division 1.

B. Accept conduit on site. Inspect for damage.

C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

1.09 PROJECT CONDITIONS

A. Duct bank routing is shown on Drawings in approximate locations unless dimensions are indicated. Route as required to complete duct system.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The material covered by this Specification is intended to be standard material of proven performance as manufactured by reputable concerns. Material shall be fabricated, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as specified herein and indicated on the Drawings.

2.02 DUCT SYSTEM

A. Underground duct system shall consist of parallel runs of Schedule 40 PVC conduit or rigid galvanized steel conduit encased in concrete envelopes, unless otherwise specified herein or indicated on the Drawings.

B. Nonmetallic conduit joints shall be made with standard Schedule 40 PVC couplings and PVC solvent cement of the same manufacturer as the conduit. All PVC conduits shall be supplied by the same manufacturer. All joints shall be staggered, installed in accordance with the manufacturer's recommendations, and made watertight.

C. Base and intermediate conduit spacers shall be furnished to provide a minimum of two-inch (2") separation between conduits. Conduit spacers shall be provided in the proper size as required for the conduit that they secure. For example, a 4" conduit spacer shall not be used to secure a 2" conduit. Conduit spacers shall be as manufactured by Carlon Electrical Products Company, Aeroquip Corporation, Underground Devices, Incorporated, or equal.

D. All 90 degree conduit elbows and/or combinations of adjacent conduit elbows that form a 90 degree bend shall be rigid galvanized steel conduit.

2.03 ELECTRIC MANHOLES

A. The concrete manholes shall be complete with metal frames and covers of size and location as specified herein and shown on the Drawings.

B. Manhole frames and covers shall be Neenah R-1640C1, or equal, with Type A anchor ring. Entire manhole assembly shall be AASHTO H20 heavy duty rated. Covers shall be furnished with drop handles.

C. All electric manholes shall be provided with heavy duty non-metallic cable racks. Cable racks shall be rated for the application, with a minimum loading of 450lbs per rack arm. Cable rack system shall be Heavy Duty type as manufactured by Underground Devices, Incorporated or equal.

2.04 ELECTRIC HANDHOLES

A. The electric handholes shall be a precast polymer concrete enclosure suitable for use as part of an underground electric raceway system. The enclosure shall meet or exceed the requirements of ANSI/SCTE 77-2010.

B. The enclosure design and test load rating shall be Tier 15.

C. The enclosure shall be the straight side design to allow easy adjustment of box to grade. The box shall be stackable for increased depth.

D. Handhole opening size shall be as required to suit the application, 6” X 8”, minimum.

E. Extra heavy-duty covers shall be furnished and installed with Tier 15 enclosures. Covers shall be provided with cover hooks.

F. The electric handholes shall be Style “PG” or “PC” (as required) Quazite boxes as manufactured by Hubbell, Pencell Plastics equivalent, Highline Products equivalent, or equal.

PART 3 EXECUTION

3.01 GENERAL

A. The underground duct system, manholes, and handholes shall be installed as specified herein, indicated on the Drawings, and in accordance with manufacturers’ instructions.

3.02 DUCT SYSTEM

A. All underground conduits shall be encased in concrete and shall be reinforced. Encasement and reinforcement shall be as indicated in the standard details. Concrete shall be furnished and installed in accordance with Section 03100.

B. Concrete pours shall be complete from handhole to handhole and from manhole to manhole where practicable. Partial pours in general shall not be permitted. Where a complete pour is impractical, written authorization shall be obtained from the Engineer for the partial pour.

C. Conduit ductbank elevations at the manholes and handholes shall be based on minimum ductbank cover as indicated in the standard details, or deeper to avoid conflicts with other obstacles. Where deviation is necessary to clear unforeseen obstacles, the elevations may be changed after authorization by the Engineer.

D. Slope all conduits continuously away from structures and buildings with a minimum slope of 3” per 100’ unless otherwise indicated on the Drawings.

E. The minimum clearance from the top of the concrete encasement and finished grade shall be as indicated in the standard details, except where otherwise accepted in writing by the Engineer or shown on the Drawings.

F. Care shall be exercised during excavation for the duct banks to prevent digging too deep. Backfilling of low spots with earth fill will not be permitted unless thoroughly

compacted and acceptable to the Engineer.

G. If a specific ductbank arrangement is shown on the Drawings, the conduits in that ductbank shall be arranged as shown. Where no specific ductbank arrangement is shown on the Drawings, the Contractor shall arrange conduits within each ductbank based on field conditions. Spare conduits shown going from ductbanks into buildings or structures shall be stubbed up in the location(s) as indicated on the Drawings.

H. A minimum of one (1) ground rod, furnished in accordance with Section 16170, shall be driven adjacent to each manhole, handhole, or other concrete box. A No. 4/0 AWG bare copper ground cable shall be connected between this rod and the copper ground strap using a silicon bronze connector. All ground rods shall be interconnected by means of the No. 4/0 AWG bare copper ground cable located within each duct bank. The ends of these cables shall also be connected to substation and/or building ground buses where the conduits terminate.

I. Care shall be exercised, and temporary plugs shall be installed during installation to prevent the entrance of concrete, mortar, or other foreign matter into the conduit system. Conduit spacers shall be utilized to support conduit during the pouring of concrete to prevent movement and misalignment of the conduits. Conduit spacers shall be installed in accordance with manufacturer's instructions unless otherwise noted. Horizontal spacing of conduit spacers along ductbank shall be as indicated on the Standard Details.

J. Large radius elbows shall be used for all 90 degree conduit bends in the duct system. The following shall be the minimum elbow radii:

TRADE SIZE	1"	1-1/2"	2"	3"	4"
MIN. RADIUS	12"	24"	24"	36"	48"

K. Prior to pulling cables, the Contractor shall thoroughly clean the inside of each length of conduit by swabbing.

L. After all cables have been installed, all spare and/or unused conduit openings shall be sealed or plugged as specified in Section 16130. A 250 lb. test pull rope shall be provided in the entire length of all spare and/or unused conduits.

M. Construct concrete-encased conduits connecting to underground structures to have a flared section adjacent to the manhole to provide shear strength. Construct underground structures to provide shear strength. Construct underground structures to provide for keying the concrete encasement of the duct line into the wall of the structure. Use vibrators when this portion of the encasement is poured to ensure a seal between the encasement and the wall of the structure.

N. Six (6) inches above all duct banks, the Contractor shall furnish and install a two (2) inch wide red plastic electrical hazard tape. Tapes shall be metallic detectable type and shall have a continuous message in bold black letters: "ELECTRIC LINE BURIED BELOW." Tape shall be Detectable Identoline by Brady, or equal.

O. The Contractor shall perform all earthwork including excavation, backfill, bedding, compaction, shoring and bracing, grading and restoration of surfaces and seeded areas disturbed during the execution of the work.

3.03 ELECTRIC MANHOLES

A. Electric manholes shall be installed to a sufficient depth to accommodate the required grading of ducts as well as maintaining a minimum distance of 14” from the bottom of the lowest duct centerline entrances to finished floor line and/or highest duct centerline entrance to the roof. All manholes shall be built on, or placed over, a 6” layer of well-tamped gravel.

B. Duct envelopes and conduit with bell ends shall enter at approximately right angles to the walls, except as may otherwise be shown on the Drawings.

C. All concrete work and fully assembled manholes shall be completely watertight and shall be furnished with sloped floors that pitch towards a sump pit. The outside surfaces shall be coated with an approved asphaltic waterproofing compound (all sides, bottom, and roof). Precast concrete manholes may be installed; however, all requirements of this section and other divisions of the Specifications and the details shown on the Drawings shall apply.

D. Install pulling eye irons imbedded in walls opposite each duct entrance securely fastened to manhole reinforcing rods. All hardware shall be hot-dipped galvanized steel. Copper bars shall be provided in the walls for grounding. No. 4/0 AWG bare copper cables shall be connected to these bars and all non-current carrying metal parts shall be grounded to these copper bars.

E. All cables shall be well supported on walls by nonmetallic cable racks. The cable racks shall be heavy-duty type for medium and low voltage power cables and light duty type for control, signal, communications and similar small conductors. All racks shall be rigidly attached to the wall and equipped with adjustable rack arms.

3.04 ELECTRIC HANDHOLES

A. Electric handholes shall be installed to a sufficient depth to accommodate the required grading of ducts as well as maintaining a minimum distance of 9” from the bottom of the lowest duct centerline entrances to finished floor line and/or highest duct centerline entrance to roof. All handholes shall be built on, or placed over, a 6” layer of well-tamped gravel.

B. Duct envelopes and conduit with bell ends shall enter at approximately right angles to the walls, except as may otherwise be shown on the Drawings.

C. All fully assembled handholes shall be completely watertight.

D. All individual cables and/or bundles of conductors shall be identified and “dressed” along the wall of the enclosure. Cable racks as specified herein shall be provided if any handhole dimension exceeds 24 inches.

END OF SECTION

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SECTION 26 05 19.03

WIRE AND CABLE

WIRE AND CABLE

1.01 SECTION INCLUDES

A. Building wire and cable.

B. Wiring connectors and connections.

1.02 RELATED SECTIONS

A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
   1. Identification
   2. Conduit
   3. Boxes

1.03 REFERENCES

A. NECA Standard of Installation (National Electrical Contractors Association)

B. ANSI/NFPA 70 - National Electrical Code.

C. NETA ATA - Acceptance Testing Specifications for Electrical Power

D. Distribution Equipment and Systems (International Electrical Testing Association)

1.04 SUBMITTALS

A. Submit under provisions of Division 1.

B. Provide for each cable or conductor type.

1.05 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. or other North Carolina recognized Third Party Testing Agency.

1.06 PROJECT CONDITIONS

A. Verify that field measurements are as shown on Drawings.

B. Conductor sizes are based on copper.

C. Wire and cable routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required to meet Project Conditions.

1.07 COORDINATION

A. Coordinate Work under provisions of Division 1.

B. Determine required separation between cable and other work.

C. Determine routing to avoid interference with other work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The wire and cable to be furnished and installed for this project shall be the product of manufacturers who have been in the business of manufacturing wire and cable for a minimum of ten (10) years. Wire and cable shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as specified herein and indicated on the Drawings. Only one (1) manufacturer for each wire and cable type shall be permitted.

B. The wire and cable manufacturer shall be ISO 9000 registered.

2.02 POWER WIRE AND CABLE

A. Power cable and wire installed between the output terminals of a VFD and the respective motor shall consist of stranded copper conductor with insulation type XHHW/XHHW-2, rated 90°C and 600V.

B. Power cable and wire for all other loads shall consist of stranded, copper conductor with insulation type THHN, 90°C for dry locations and THHN/THWN-2, 75°C for wet locations.

C. Conductors shall be stranded copper per ASTM-B8 and B-3, and Class B or C stranding contingent on the size unless otherwise specified. Minimum size wire shall be No. 12 AWG.

D. Multi-conductor power cable assemblies shall be UL 1277 Listed, provided with a bonding conductor, and furnished with an overall PVC jacket.

E. Power wire and cable shall be as manufactured by the Okonite Company, the Southwire Company, Encore Wire Corp., General Cable, or equal.

2.03 CONTROL CABLE

A. 600 volt control cable shall consist of stranded, copper conductor with insulation type THHN, 90°C for dry locations and THHN/THWN-2, 75°C for wet locations, and 600V.

B. Conductors shall be stranded copper per ASTM B-8 and B-3, and Class B or C stranding contingent on the size unless otherwise specified. Minimum wire size shall be No. 14 AWG.

C. Multi-conductor control cable assemblies shall be UL 1277 Listed, provided with a bonding conductor, and furnished with an overall PVC jacket.

D. Control cable shall be as manufactured by the Okonite Company, the Southwire Company, Encore Wire Corp., General Cable, or equal.

2.04 LIGHTING AND RECEPTACLE WIRE

A. The lighting and receptacle branch circuit wire shall consist of solid, copper conductors with insulation type THHN, 90°C for dry locations and THHN/THWN-2, 75°C for wet locations.

B. Conductors shall be solid copper per ASTM- B-3. Minimum size wire shall be No. 12 AWG.

C. Lighting and receptacle wire shall be as manufactured by the Okonite Company, the Southwire Company, Encore Wire Corp., General Cable, or equal.

2.05 INSTRUMENTATION CABLE

A. The instrumentation cable for analog signals shall be single, shielded, twisted pairs or triads with 600 volt insulation and shall have a 75°C (minimum) insulation rating.

B. Conductors shall be tin or alloy coated (if available), soft, annealed copper, stranded per ASTM-B8, Class B stranding unless otherwise specified. Minimum size wire shall be No. 16 AWG.

C. The instrumentation cable shall be Okoseal-N Type P-OS for single pair or triad applications and Okoseal-N Type SP-OS for multiple pair or triad applications as manufactured by the Okonite Company, Belden equivalent, Southwire Company equivalent, or equal.

PART 3 EXECUTION

3.01 POWER, CONTROL, AND LIGHTING/RECEPTACLE WIRE AND CABLE INSTALLATION

A. The wire and cable shall be installed as specified herein and indicated on the Drawings.

B. The cables shall be terminated in accordance with the cable and/or termination product manufacturer's instructions for the particular type of cable.

C. To minimize oxidation and corrosion, wire and cable shall be terminated using an oxide-inhibiting joint compound recommended for "copper-to-copper" connections. The compound shall be Penetrox E as manufactured by Burndy Electrical, or equal.

D. Splices shall not be allowed in the underground manhole and handhole systems. If splices are required, the Contractor shall obtain approval in writing from the Engineer prior to splicing. Splicing materials shall be barrel type butt splice connectors and heat shrink tubing as manufactured by 3M, Ideal, or equal. No splicing of instrumentation cable is allowed. The use of screw-on wire connectors (wire nuts) shall only be permitted for lighting and receptacle circuits.

E. Wire and Cable Sizes
1. The sizes of wire and cable shall be as indicated on the Drawings, or if not shown, as approved by the Engineer. If required due to field routing, the size of conductors and respective conduit shall be increased so that the voltage drop measured from source to load does not exceed 2-1/2%.

F. Wiring Supplies
1. Only electrical wiring supplies manufactured under high standards of production and meeting the approval of the Engineer shall be used.
2. Rubber insulating tape shall be in accordance with ASTM Des. D119. Friction tape shall be in accordance with ASTM Des. D69.

G. Training of Cable
1. The Contractor shall furnish all labor and material required to train cables around cable vaults within buildings and in manholes and handholes in the outdoor underground duct system. Sufficient length of cable shall be provided in each handhole, manhole, and vault so that the cable can be trained and

racked in an approved manner. In training or racking, the radius of bend of any cable shall be not less than the manufacturer's recommendation. The training shall be done in such a manner as to minimize chaffing.

2. Instrumentation cable shall be racked separate from other AC and DC wiring to maintain the required separation as follows:
   a. 18 inches for 480/277VAC wiring
   b. 12 inches for 208/120VAC wiring
   c. 6 inches for 24VDC wiring

H. Conductor Terminations

1. Where wires are terminated at equipment which requires lugs, connections shall be made by solderless mechanical lug, crimp type ferrule, or irreversible compression type lugs. Reference individual equipment specification sections as applicable for additional termination requirements.
2. Where enclosure sizes and sizes of terminals at limit switches, solenoid valves, float switches, pressure switches, temperature switches, and other devices make terminations impractical due to the size of the field wiring, the Contractor shall terminate field wiring in an adjacent junction per the requirements of Section 16130, Boxes, complete with terminal strips. Contractor shall install the smaller wiring from the device to the junction box in a conduit, using the terminal strip as the means for joining the two different wire sizes. Splicing of wires in lieu of using terminal strips is not acceptable.
3. All spare conductors shall be terminated on terminal blocks mounted within equipment or junction boxes. Unless otherwise noted, coiling up of spare conductors within enclosure is not acceptable.

3.02 INSTRUMENTATION CABLE INSTALLATION

A. The Contractor shall install all cable or conductors used for instrumentation wiring (4 20 mA DC, etc.) in conduit as specified in Section 16111 - Conduit. Only instrumentation cable as specified herein shall exclusively occupy these conduits. No other wiring for AC or discrete DC circuits shall be installed in these conduits.

B. All shielding shall be continuous and shall be grounded at one point only.

C. Where instrumentation cables are installed in panels, manholes, handholes, and other locations, the Contractor shall arrange wiring to provide maximum clearance between these cables and other conductors. Instrumentation cables shall not be installed in same bundle with conductors of other circuits.

D. Special instrument cable shall be as specified or recommended by the manufacturer of the equipment or instruments requiring such wiring. Installation, storage, and terminations, shall be per manufacturer's recommendations.

3.03 FIBER OPTIC CABLE INSTALLATION

A. The Contractor shall install the fiber optic cable furnished by the General Contractor and/or the Instrumentation and Control Subcontractor. The cable shall be installed in its respective raceway system(s) as specified herein, indicated on the Drawings, and in accordance with the cable manufacturer's instructions. Reference Division 17 for additional information regarding the fiber optic cable.

3.04 TESTING

A. All testing shall be performed in accordance with the requirements of the General Conditions and Division 1. The following tests are required:
   1. Shop Test

a. Cable and wiring shall be tested in accordance with the applicable ICEA Standards. Wire and cable shall be physically and electrically tested in accordance with the manufacturer's standards.

2. Field Tests
   a. After installation, all wires and cables shall be tested for continuity. Testing for continuity shall be "test light" or "buzzer" style.
   b. After installation, some wires and cables shall be tested for insulation levels. Insulation resistance between conductors of the same circuit and between conductor and ground shall be tested. Testing for insulation levels shall be as follows:
      1) For #8 AWG and larger 600V power and control cable, apply 1,000 VDC from a Megaohmeter for one (1) minute for all 600V wires and cables installed in lighting, control, power, indication, alarm and motor feeder circuits. Resistance shall be no less than 100 Megaohms. Insulation testing is not required for power and control cables smaller than #8 AWG.
      2) 600V instrumentation signal cable shall be tested from conductor to conductor, conductor to shield, and conductor to ground using a Simpson No. 260 volt-ohmmeter, or approved equal. The resistance value shall be 200 Megaohms or greater.

B. Wires and cables shall be tested before being connected to motors, devices or terminal blocks.

C. If tests reveal defects or deficiencies, the Contractor shall make the necessary repairs or shall replace the cable as directed by the Engineer, without additional cost to the Owner.

D. All tests shall be made by and at the expense of the Contractor who shall supply all testing equipment. Test reports shall be submitted to the Engineer.

END OF SECTION

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SECTION 26 05 26.03

GROUNDING AND BONDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Grounding electrodes and conductors.

B. Equipment grounding conductors.

C. Bonding.

1.02 REFERENCES

A. ANSI/NFPA 70 - National Electrical Code.

B. UL 467 – Grounding and Bonding Equipment

C. IEEE 81 – Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

1.03 GROUNDING ELECTRODE SYSTEM

A. Metal underground water pipe.

B. Ductile iron force main (if required).

C. Rod electrode.

D. Ground ring.

E. Concrete-encased electrode.

F. Building structural steel columns.

G. Metallic chemical storage tanks.

1.04 PERFORMANCE REQUIREMENTS

A. Grounding System Resistance: 5 ohms or less.

B. submittals

C. Submit under provisions of Division 1.

D. Product Data: Provide data for grounding electrodes and connections.

E. Test Reports: Indicate overall resistance to ground.

F. Manufacturer’s Instructions: Include instructions for storage, handling, protection, examination, preparation and installation of exothermic connectors.

1.05 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division 1.

B. Accurately record actual locations of connections to grounding electrode system components.

1.06 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. or other North Carolina Recognized Third Party Testing Agency.

PART 2 PRODUCTS

2.01 ROD ELECTRODE

A. Manufacturers:
   1. Carolina Galvanizing Corp.
   2. Blackburn
   3. Copperweld

B. Material: Copper-clad steel.

C. Diameter: 3/4 inch.

D. Length: 10 feet.

2.02 MECHANICAL CONNECTORS

A. Manufacturers:
   1. Ilsco
   2. O-Z/Gedney
   3. Thomas & Betts

B. Material: Bronze.

2.03 WIRE

A. Material: Copper.

B. Insulation:
   1. Grounding Electrode or Bonding Conductor: THHN/THWN-2 or bare as indicated on the drawings.
   2. Equipment Grounding Conductor: THHN/THWN-2.
   3. Insulation for conductors #6 AWG and smaller shall be green from the manufacturer. Insulation for larger conductors shall be marked with green paint or wrapped with green tape.

2.04 EXOTHERMIC CONNECTORS

A. Manufacturer's
   1. Cadweld
   2. Thermoweld
   3. Furseweld

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that final backfill and compaction has been completed before driving rod electrodes.

3.02 INSTALLATION

A. Install Products in accordance with manufacturer's instructions.

B. Bond together the metal underground water pipe, rod electrode(s), concrete-encased electrode, building steel, metal equipment mounting rack structure, ground ring, and service equipment to the extent that these items are present at each grounding location. If there is no metal water pipe available, bond to the ductile iron force main instead.

C. Bonding of grounding electrode conductor to rod electrodes, building steel, and concrete-encased electrodes shall be accomplished by exothermic weld process.

D. Install rod electrodes at locations indicated. Install additional rod electrodes as required to achieve specified resistance to ground. Additional rod electrodes shall not be less than six feet apart.

E. Provide bonding to meet Regulatory Requirements.

F. Equipment Grounding Conductor: Provide separate, green insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

G. Ground Grid
   1. A main ground grid shall be provided for each structure and interconnecting structure grids consisting of driven ground rods as shown on the Drawings. The ground rods shall be interconnected by the use of copper cable exothermically welded to the rods. The grounding cables shall be installed after the excavations for the building have been completed and prior to the pouring of concrete for the footings, mats, etc. Copper "pigtails" shall be connected to the ground grid and shall enter the buildings and structure from the outside and shall be connected to steel structures, and equipment as described in this Section and as required to provide a complete grounding system. The copper pigtails shall be exothermically welded to the ground grid, and connected to building reinforcement steel by hydraulic crimp.

3.03 EQUIPMENT AND CIRCUITS

A. Conduit Systems:
   1. Ground all metallic conduit systems.

B. Boxes, Cabinets, Enclosures, and Panelboards:
   1. Bond the equipment grounding conductors to each pull box, junction box, outlet box, cabinet, and other enclosure through which the conductors pass.
   2. Provide lugs in each box and enclosure for equipment grounding conductor termination.
   3. Provide ground bars in panelboards, bolted to the housing, with sufficient lugs for terminating the grounding electrode and equipment grounding conductors.
   4. For metal conduit systems connect wiring device grounding terminal to outlet box with bonding jumper and to branch circuit equipment grounding conductor. Where boxes are nonmetallic, bond to equipment grounding conductor only.
   5. Grounding type insulated bonding bushings and jumpers shall be provided where conduits terminate in service entrance equipment, transformers, and where concentric, eccentric, or over-sized knockouts are encountered. The jumpers shall be sized per NEC Table 250-66 for services, generator feeders and transformers, and per Table 250.122 for branch circuits.

C. Motors and Starters:
   1. Provide lugs in motor terminal box and starter housing for equipment grounding conductor termination.

D. Lighting Fixtures:
   1. Connect equipment grounding conductor to fixture grounding terminal.
   2. Fixtures connected with flexible conduit shall have a green insulated equipment grounding conductor included with the power wires to the fixture through the flexible conduit.

E. Electrical Appliances and Equipment:
   1. Fixed electrical appliances and equipment shall have a ground lug installed for termination of the green insulated equipment grounding conductor.

F. Dry Type Transformers and Generators (Separately Derived Systems):
   1. Bond together the grounded (neutral) conductor and equipment grounding conductor of the derived system.
   2. A grounding electrode conductor shall be used to connect the grounded conductor of the derived system to the nearest available effectively grounded structural metal member of the building or the nearest effectively grounded metal water pipe within 5 feet from the point of entrance into the building. Where neither of these grounding methods is available, connection may be made to a ground ring or rod electrode.

3.04 CONDUCTIVE PIPING

A. Bond all conductive piping systems in the building or at the structure which could possibly become energized to the system ground.

3.05 BONDING BUILDING STEEL

A. Bond structural steel framing system with #4/0 bare copper conductor when structure is not electrically continuous at rated walls and expansion joints.

3.06 FIELD QUALITY CONTROL

A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

B. Use suitable test instrument to measure resistance to ground of system. Perform testing in accordance with test instrument manufacturer's recommendations using the fall- of-potential method.

END OF SECTION

SECTION 26 05 29

SUPPORTING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Conduit and equipment supports.

B. Anchors and fasteners.

C. Cable ties.

D. Steel channel.

E. Equipment racks.

1.02 REFERENCES

A. NECA - National Electrical Contractors Association.

B. ANSI/NFPA 70 - National Electrical Code.

1.03 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. or other North Carolina Third Party Testing Agency.

1.04 SUBMITTALS

A. Submit the following in accordance with Division 1.
   1. Product Data: Provide manufacturer's catalog data for fastening systems.
   2. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of the product.
   3. Shop Drawings: Submit shop drawings for the equipment mounting rack to include the following:
      a. Indicate assembly dimensions, locations of support posts, and general construction details.
      b. Indicate welded connections.
      c. Provide a Bill of Materials to include all components of the assembly.
      d. Indicate location and type of insulating materials.

PART 2 PRODUCTS

2.01 PRODUCT REQUIREMENTS

A. Materials and Finishes: Provide adequate corrosion resistance suitable to the application. Where materials are cut, welded, or scratched leaving an unprotected area, items shall be painted with a material providing equivalent protection to the factory provided finish.

B. Provide materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products.

C. Anchors and Fasteners:
   1. Concrete Structural Elements: Use expansion anchors, powder actuated anchors, or preset inserts.
   2. Steel Structural Elements: Use stainless steel bolts, nuts, and washers. Galvanized beam clamps may be used to support conduit from steel beams.
   3. Concrete Surfaces: Use self-drilling anchors or expansion anchors.
   4. Hollow Masonry and Gypsum Board Partitions: Use toggle bolts or hollow wall fasteners.
   5. Solid Masonry Walls: Use expansion anchors.
   6. Wood: Use wood screws.

2.02 CABLE TIES

A. Manufacturer
   1. Burndy
   2. Panduit
   3. Gardner Bender

B. In corrosive environments: Provide Grade 304 Stainless steel cable ties with a low profile clamping bearing head and fully adjustable strap accommodating many bundle diameters. Temperature Range: -112°F to 1000°F.

C. In non-corrosive environments: Provide Nylon 6/6 UV stabilized, weather resistant grade cable ties. Temperature Range: -40°F to 185°F.

2.03 STEEL CHANNEL

A. Manufacturer
   1. Superstrut
   2. Unitstrut
   3. Kindorff
   4. Ocal

B. Description: Galvanized steel, PVC coated steel, or other material as indicated.

2.04 EQUIPMENT RACKS

A. All exterior electrical equipment shall be protected from the weather by means of a weather shield fabricated of 3/16” aluminum sheet. Panels shall be of one-piece construction; butt welds will not be accepted. Corner welds will be continuous. The weather shield shall be of adequate size to accommodate all equipment shown. The structure shall consist of galvanized pipe supports tied together with PVC coated steel channel for attachment of the weather shield. A suitable barrier of nylon or similar material shall be placed between dissimilar metals to prevent galvanic corrosion.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Provide anchors, fasteners, and supports in accordance with NECA "Standard of Installation".

C. Do not fasten supports to pipes, ducts, mechanical equipment, and conduit.

D. Obtain permission from Engineer before using power-actuated anchors.

E. Do not drill or cut structural members.

F. Install surface-mounted cabinets and panelboards with minimum of four anchors.

G. Aluminum and galvanized steel surfaces in contact with concrete or grout shall have a bituminous coating.

END OF SECTION

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SECTION 26 05 33.16

CONDUIT

CONDUIT

1.01 SECTION INCLUDES

A. Rigid steel conduit

B. Flexible metal conduit

1.02 LIQUID-TIGHT FLEXIBLE CONDUIT

A. Liquid-tight flexible non-metallic conduit

B. Rigid nonmetallic conduit

C. PVC coated metallic conduit

D. Electrical metallic tubing

E. Conduit fittings

1.03 RELATED SECTIONS

A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
   1. Trenching for Utilities
   2. Grounding and Bonding
   3. Supporting Devices
   4. Electrical Identification
   5. Duct Bank
   6. Boxes

1.04 REFERENCED STANDARDS

A. The latest revision, at the time of bidding, of the publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
   1. American National Standards Institute (ANSI)
      a. Rigid Steel Conduit, Zinc Coated.
      b. Electrical Metallic Tubing, Zinc Coated.
      c. Intermediate Metal Conduit, Zinc Coated.
      d. ANSI/NFPA 70 - National Electrical Code.
   2. ETL/Intertek
      a. ETL PVC-001 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
   3. National Electrical Contractors Association
      a. NECA "Standard of Installation."
   4. National Electrical Manufacturers Association
      a. Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
      b. Electrical Plastic Tubing (EPT) and conduit (EPC-40 and EPC-80)
      c. PVC Fittings for Use with Rigid PVC Conduit and Tubing.
      d. FB 1-2012 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.

e. FB 2.10-2012 - Selection and Installation Guidelines for Fittings for Use with Non-Flexible Metallic Conduit or Tubing (Rigid Metal Conduit, Intermediate Metal Conduit, and Electrical Metallic Tubing)
f. FB 2.20-2012 - Selection and Installation Guidelines for Use with Flexible Electrical Conduit and Cable
g. OS 1-2008 (R 2010) - Sheet-Steel Outlet Boxes, Device Boxes, Covers and Supports
h. OS 2-2008 (R 2010) - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports
i. OS 3-2007 - Selection and Installation Guidelines for Electrical Outlet Boxes
j. RV 3-2010 - Application and Installation Guidelines for Flexible and Liquidtight Flexible Metal and Nonmetallic Conduits

1.05 DESIGN REQUIREMENTS

A. Conduit Size: ANSI/NFPA 70.

B. Wiring method shall be wire in conduit or other raceway unless otherwise noted.

1.06 SUBMITTALS

A. Product data: Provide for each type of conduit used.

1.07 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division 1.

B. Accurately record actual routing of conduits larger than 2 inches.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Handle Product in accordance with Division 1.

B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

C. Protect PVC conduit from sunlight.

1.09 PROJECT CONDITIONS

A. Verify routing and termination locations of conduit prior to rough-in.

B. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The material covered by this Specification is intended to be standard material of proven performance as manufactured by reputable concerns. Material shall be fabricated, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as specified herein and shown on the Drawings.

2.02 CONDUITS

A. Unless specified otherwise herein, or indicated on the Drawings, all conduits shall be rigid, hot-dipped galvanized steel. Minimum size conduit shall be 3/4 inch unless otherwise indicated on the Standard Details. Unless specified otherwise herein or indicated on the Drawings, all encased conduits shall be PVC Schedule 40, minimum size 1 inch. The Contractor, at his option, for ease of installation to accommodate saddle size, may increase the size of encased conduits to 2-inch. However, no combining of circuits/conductors will be permitted in these larger conduits.
   1. All components (fittings, couplers, connectors, etc.) of the conduit system shall be of the same or compatible material of construction. Coated conduit systems shall include factory coated fittings couplings, connectors, and other components compatible with and approved for coated conduit systems.
   2. Reference the "Conduit Uses" portion of this specification for additional information regarding conduit.

B. Rigid Steel Conduit
   1. Steel conduits shall be rigid type, heavy wall, hot-dipped galvanized inside and outside and as manufactured by Allied Tube and Conduit Corporation, Wheatland Tube Company, Jones & Laughlin Steel Company, or equal.
   2. Each length of conduit shall be shipped with a coupling on one end and a color coded thread protector at the other end.

C. Flexible Metal Conduit
   1. Flexible metal conduit (FMC) shall be galvanized steel, single strip. FMC shall be UL listed. FMC shall be used to connect all indoor vibrating equipment, installed in dry locations, above reflected ceilings to lighting fixtures, and other applications as accepted by the Engineer. FMC shall be Galflex Type RWS as manufactured by Southwire, Type BR as manufactured by Electri-Flex, or equal.
   2. Liquid Tight Flexible Metal Conduit
   3. Liquid tight flexible conduit (LFMC) shall be galvanized steel, single strip, with a copper strip interwoven and suitable as a grounding means. LFMC shall be UL listed. LFMC shall have an extruded moisture and oil-proof PVC jacket. LFMC shall be Titan Type UL as manufactured by Southwire, Liquatite Type "LA" as manufactured by Electri-Flex, Anaconda Type UA as manufactured by Anamet Electrical, Inc., or equal.
   4. PVC coated or stainless steel watertight connectors shall be used with liquid tight flexible metal conduit on both ends. LFMC shall be used to connect all vibrating equipment installed outdoors, in wet or damp areas, and other applications as directed by the Engineer.

D. Liquid Tight Flexible Non-Metallic Conduit
   1. Liquid tight flexible non-metallic conduit (LFNC) shall be constructed of PVC. LFNC shall be UL listed. LFNC shall have an extruded moisture and oil-proof PVC jacket. LFNC shall be Ultratite Type NM as manufactured by Southwire, Type NM as manufactured by Electri-Flex, Anaconda Type NMUA by Anamet Electrical, Inc., or equal.
   2. Watertight connectors shall be used with liquid tight flexible non-metallic conduit on both ends. LFNC shall be used to connect all vibrating equipment installed in sodium hypochlorite storage and transfer areas as specified herein, and other applications as directed by the Engineer or as indicated on the drawings.

E. Rigid Nonmetallic Conduit
   1. Rigid nonmetallic conduit shall be Schedule 40 polyvinyl chloride (PVC), 90 deg C, UL rated and shall conform to NEMA TC 2. Fittings and conduit bodies shall conform to NEMA TC3.
   2. Rigid non-metallic conduit shall be as manufactured by Carlon, Triangle Conduit and Cable, Cantex, Inc., or equal.

F. PVC Coated Metallic Conduit
   1. PVC coated rigid steel conduit shall be furnished and installed as specified herein and indicated on the Drawings. The product shall be rigid galvanized steel conduit covered with a bonded 40 mil (minimum) thickness PVC jacket and coated inside with urethane. The conduit shall comply with NEMA RN-1 and shall be "Plasti-Bond Red" as manufactured by Robroy Industries, "OCAL-Blue" as manufactured by Thomas & Betts, Perma-Cote Supreme by Perma-Cote Industries, Kor Kap equivalent, or equal.

G. Electrical Metallic Tubing
   1. Electrical metallic tubing shall meet ANSI C80.3 and shall be UL listed. The conduit shall be furnished and installed in accordance with Article 358 of the NEC. Electrical metallic tubing shall be manufactured by LTV Steel Tubular Products Company, "Electrunite", Triangular PWC, Inc., Allied Tube and Conduit Corporation, or equal.
   2. The conduit shall be cold rolled steel tubing with a zinc coating on the outside and protected on the inside by a zinc, enamel, or equivalent corrosion resistant coating and conforming to the requirements of ANSI C 80.3, latest edition.

H. Conduit Fittings
   1. Fittings for all conduit types shall conform to UL 467 and UL 514 as applicable.
   2. Fittings for electrical metallic tubing shall be rain-tight and concrete-tight, and shall be plated steel hexagonal threaded compression type.
   3. Set screw or indentor type connectors shall not be used. Fittings for conduit installed in wet locations and underground shall provide a watertight joint. Fittings for rigid conduit shall be threaded.
   4. Fittings or bushings shall be installed in easily accessible locations.
   5. Where exposed conduits pass across structural expansion joints, approved weatherproof telescopic type expansion fittings shall be used. Fittings shall be OZ/GEDNEY Type AX, Crouse-Hinds Type XJG, or equal, watertight, and permit movement up to 4 inches. Each fitting shall be equipped with approved bonding jumpers around or through each fitting.
   6. Where embedded conduits pass through expansion joints, approved watertight, concrete-tight deflection/expansion fittings shall be used. Fittings shall compensate for movement of ¾-inch from the normal in all directions. Fittings shall be OZ/GEDNEY Type DX, Crouse-Hinds Type XD, or equal.
   7. Conduit fittings ("condulets") shall be used on exposed conduit work for changes in direction of conduit runs and breaking around beams. "Condulets" shall be cast ferrous alloy, galvanized or cadmium plated, as manufactured by Crouse Hinds, OZ/Gedney, Appleton Company, or equal. Coated fittings and boxes shall be used with coated conduit in all chemically aggressive areas or where called for on the Drawings. Covers shall be of a design suitable for the purpose intended. In damp areas, the outside condulets shall be made watertight. Install all condulets with the covers accessible. Use proper tools to assemble conduit system to prevent injury to the plastic covering. No damage to the covering shall be permitted.

8. Conduit fittings shall be cast type of non ferrous metal or malleable iron thoroughly coated inside and outside with metallic zinc or cadmium after all machining has been completed. Cast fittings shall be provided with heavy threaded hubs to fit the conduit required. Covers shall be of the same material as the fittings to which they are attached and shall be screwed on with rubber or neoprene gaskets between the covers and fittings. Cast fittings 1 1/2 inches and above shall be of the "mogul" type.
9. PVC coated fittings shall be used with PVC coated conduit. All conduit nipples, elbows, couplings, boxes, fittings, unions, expansion joints, connectors, bushing, and other components of the raceway system shall be factory coated to maintain the corrosion-resistant integrity of the conduit system. The coated conduit and its respective components shall all be provided by the same manufacturer. Coated conduit shall be used in all areas specified herein or indicated on the Drawings.

PART 3 EXECUTION

3.01 CONDUIT AND FITTINGS

A. Unless otherwise specified herein or indicated on the Drawings, the minimum size conduit shall be 3/4 inch for exposed work and 1 inch for conduit encased in concrete or mortar.

B. Conduit home runs for lighting circuits are not necessarily indicated on the Drawings; however, the circuit numbers are shown. Conduit shall be furnished and installed for these lighting circuits and shall be installed as required to suit field conditions, subject to review and acceptance by the Engineer.

C. Conduit shall be installed concealed unless otherwise indicated or specified. Conduit may be run exposed on walls only where concealing is not practical, or at the direction of the Engineer.

D. Where exposed, maintain a minimum distance of 6 inches from parallel runs of flues or water pipes. Conduit runs shall be installed in such locations as to avoid steam or hot water pipes. A minimum separation of 12 inches shall be maintained where conduit crosses or parallels hot water or steam pipes.

E. A non-metallic raceway containing instrumentation cable (if specifically allowed herein) where installed exposed shall be installed to provide the following clearances:
   1. Raceway installed parallel to raceway conductors energized at 480 through 208 volts shall be 18 inches and 208/120 volts shall be 12 inches.
   2. Raceway installed at right angles to conductors energized at 480 volts or 120/208 volts shall be 6 inches.

F. Where practical, exposed raceways containing instrumentation cable shall cross raceway containing conductors of other systems at right angles.

G. For floor mounted equipment, conduit may be installed overhead and dropped down, where underfloor installation is not practical. Groups of conduits shall be uniformly spaced, where straight and at turns. Conduit shall be cut with a hacksaw or an approved conduit cutting machine and reamed after threading to remove all burrs. Securely fasten conduit to outlets, junction and pull boxes to effect firm electrical contact. Join conduit with approved couplings. Conduits shall be freed from all obstructions.

H. Empty conduit systems shall be furnished and installed as indicated on the Drawings and shall have pull ropes installed. The polyethylene pull ropes shall be ¼" diameter, minimum. Not less than 12 inches of slack shall be left at each end of the pull rope.

I. Each piece of conduit installed shall be free from blisters or other defects. Each piece installed shall be cut square, taper reamed, and a coat of galvanizing and conducting compound shall be applied to the threads. Galvanizing compound shall be CRC Zinc-It or equal. Threads on conduits shall be painted with a conducting compound prior to making up in a fitting. Conduit connections shall be made with standard coupling and the ends of the conduit shall butt tightly into the couplings. Where standard coupling cannot be used, Erickson three-piece couplings shall be used. Where conduits are installed in concrete, concrete-tight three-piece couplings shall be used.

J. Conduit threaded in the field shall be of standard sizes and lengths.

K. All bends shall be made with standard factory conduit elbows or field bent elbows. Field bending of conduit shall be done using tools approved for the purpose. Heating of conduit to facilitate bending is prohibited. Field bends shall be not less than the same radius than a standard factory conduit elbow. Bends with kinks shall not be acceptable.
   1. The equivalent number of 90 deg bends in a single conduit run are limited to the following:
   2. 0
   3. 1
   4. 2
   5. 3
   6. All conduit for fiber optic cable shall have a minimum bending radius of 16 inches. Final bending radius shall be determined by the fiber optic cable manufacturer.

L. Unless otherwise specified herein, indicated on the Drawings, or required by the NEC, conduit shall be supported every 8 feet (minimum) and shall be installed parallel with or perpendicular to walls, structural members, or intersections of vertical planes and ceilings with right angle turns consisting of fittings or symmetrical bends. Conduits shall be supported within 1 foot of all changes in direction. Supports shall be approved pipe straps, wall brackets, hangers or ceiling trapeze. Supports shall be in accordance with Section 16070 – Supporting Devices.

M. In no case shall conduit be supported or fastened to another pipe or installed to prevent the removal of other pipe for repairs. Fastenings shall be by expansion bolts on concrete; by machine screws, welded threaded studs, or spring-tension clamps on steel work. Powder actuated fasteners may only be used to make connections where the use of this equipment complies with safety regulations and for structures in Seismic Design Categories A or B, unless the fasteners are approved for seismic use. Wooden plugs inserted in masonry and the use of nails as fastening media are prohibited. Threaded C clamps may be used on rigid steel conduit only. Conduits or pipe straps shall not be welded to steel.

N. The load applied to fasteners shall not exceed 1/4 of the proof test load. Fasteners attached to concrete ceilings shall be vibration and shock resistant. Holes cut to a depth of more than 1 1/2 inches in reinforced concrete beams or to a depth of more than 3/4 inch in concrete joints shall not cut the main reinforcing bars. Holes not

used shall be filled. Spring steel fasteners may only be used to support lighting branch circuit in EMT conduits to structural steel members. Conduits shall be fastened to all sheet metal boxes and cabinets with two (2) locknuts where required by the National Electrical Code to ensure adequate bonding for grounding. Where insulated bushings are used, or where bushings cannot be secured firmly to the box or enclosure, a bonding jumper shall be installed to maintain suitable grounding continuity. Locknuts shall be the type with sharp edges for digging into the wall of metal enclosures. Bushings shall be installed on the ends of all conduits and shall be of the insulating type where required by the National Electrical Code.

O. Conduit installed in concrete floor slabs or walls shall be located so as not to affect the designed structural strength of the slabs. Conduit shall be installed within the middle one third of the concrete slab except where necessary to not disturb the reinforcement. The outside diameter of conduit shall not exceed one third of the slab thickness, and conduits shall be spaced no closer than three (3) diameters except at cabinet locations. Curved portions of bends shall not be visible above the finish slab. Where embedded conduits cross expansion joints, suitable expansion/deflection fittings and bonding jumpers shall be provided. Conduit larger than 1 inch trade size shall be parallel with or at right angles to the main reinforcement. When at right angles to the reinforcement, the conduit shall be close to one of the supports of the slab. Conduits shall not be stacked more than two (2) diameters high in floor slabs. Embedded conduits shall be placed in accordance with the latest edition of ACI-318.

P. Install polyvinyl chloride (PVC) coated steel conduits when entering or exiting concrete except under electrical equipment where the conduit is not subject to physical abuse. Also install PVC coated steel conduit when transitioning between grade and a structure or an equipment stand. Extend stub-ups at least 12 inches above and below grade or finish floor. Conduits extending through the concrete floor shall be installed using straight runs (for vertical penetrations) or factory elbows (for conduits installed within the slab) of PVC coated rigid steel conduit.

Q. All conduit extending through the floor behind panels or into control centers or similar equipment may be PVC Schedule 40 and shall extend a minimum of 6 inches above the floor elevations, where practicable, with no couplings at floor elevations.

R. Unless specifically identified on the Drawings as "Direct Buried," all conduits in the earth, including conduits below slabs-on-grade, shall be concrete encased. Joints in conduit shall be staggered so as not to occur side by side. Rigid non-metallic (PVC) conduit shall be connected to PVC coated rigid steel conduit at the point where it leaves the ground, with the transition to metal conduit occurring inside the concrete encasement.

S. No more than three (3) 90 degree bends will be allowed in any one conduit run. Where more bends are necessary, a condulet or pull box shall be installed. All bends in 3/4 inch conduit shall be made with a conduit bender, and all larger sizes shall have machine bends. Joints in threaded conduit shall be made up watertight with the appropriate pipe thread sealant or compound applied to male threads only; and, all field joints shall be cut square, reamed smooth, and properly threaded to receive couplings. No running threads are permitted. All conduit ends at switch and outlet boxes shall be fitted with an approved locknut and bushing forming an approved tight bond with box when screwed up tightly in place.

T. Conduits stubbed up through concrete floors for connections to freestanding equipment and for future equipment shall be provided with an adjustable top or coupling threaded inside for plugs, set flush with the finished floor. Screwdriver operated threaded flush plugs shall be installed in conduits from which no equipment connections are made.

U. Where outlets are shown near identified equipment furnished by this or other Contractors, it is the intent of the Specifications and Drawings that the outlet be located at the equipment to be served. The Contractor shall coordinate the location of these outlets to be near the final location of the equipment served whether placed correctly or incorrectly on the Drawings. Changes in outlet locations required to serve the equipment furnished by other Contractors on the Project shall be brought to the attention of the Engineer.

V. Conduit shall be protected immediately after installation by installing flat non corrosive metallic discs and steel bushings, designed for this purpose, at each end. Discs shall not be removed until it is necessary to clean the conduit and install the conductors. Before the conductors are installed, insulated bushings shall be installed at each end of the conduit.

W. Where "all-thread" nipples are used between fittings and electrical equipment, they shall be so installed that no threads are exposed.

X. Connections from rigid conduit to motors and other vibrating equipment, limit switches, solenoid valves, level controls, and similar equipment, shall be made with short lengths of liquid tight flexible metal conduit. These conduits shall be installed in accordance with the NEC and shall be furnished and installed with appropriate connectors with devices which will provide an excellent electrical connection between the equipment and the rigid conduit for the flow of ground current. Flexible metal conduit and liquid-tight flexible metal conduit length shall be three (3) feet, maximum.

Y. Flexible metal conduit or liquid-tight flexible metal conduit installed between rigid metal conduit and motor terminal box and/or any other apparatus shall have a green insulated grounding conductor running through the flexible conduit. This conductor shall be terminated to the nearest pull box, motor terminal box, or any other apparatus ground terminal. Flexible metal conduit and liquid-tight flexible metal conduit shall be grounded and bonded per NEC Articles 348 and 350, respectively.

Z. Conduits installed within or underneath floor slabs, underground direct-buried or concrete encased conduits, and all conduits installed in areas subject to liquid inadvertently entering the conduit system shall be sealed or plugged at both ends in accordance with NEC Article 300-5(g). This requirement applies to both conduits containing conductors and "spare" conduits. Where practicable, the interior of the conduit shall be sealed as well as around the conductors by using conduit sealing bushings: Type CSB as manufactured by O/Z Gedney, or equal. Where the conduit fill does not allow the use of these bushings, the conduits shall be tightly caulked or plugged.

AA. Conduit passing through the walls and floors of buildings below grade shall be installed with appropriate watertight fittings to prevent the entrance of ground water around the periphery of the conduits. For vertical conduit penetrations through openings in concrete floors, the fittings shall be Type FSK Floor Seals as manufactured by OZ/Gedney. For conduit penetrations through openings in concrete walls, the fittings shall be Type WSK Thruwall seals as manufactured by

OZ Gedney. Conduits shall be sloped away from the buildings toward splice boxes, handholes and/or manholes to provide drainage away from the building wall.

BB. Conduits passing through sleeves in interior walls and floors shall be tightly caulked.

CC. Weatherproof, insulated throat "Meyers" hubs shall be used on all conduit entries to boxes and devices without integral hubs in process areas to maintain NEMA 4X integrity. The Contractor shall furnish and install "Meyers" hubs on all conduit entries into non-cast enclosures such as metallic or non-metallic control panels, control component enclosures, wireways, pull boxes, junction boxes, control stations, and similar type equipment when this type of equipment is located in process areas requiring NEMA 4X integrity. This specified requirement for "Meyers" hubs does not apply to any area of the plant facilities where NEMA 4X integrity is not required.

DD. The use of two (2) locknuts, one on each side of the enclosure, and a grounding bushing shall be required at all conduit terminations where hub type fittings are not required; such as electrical rooms, control rooms, and office areas.

EE. Conduit installation shall be arranged to minimize cleaning. No horizontal runs of conduit will be permitted in brick or masonry walls.

FF. Install non-metallic conduits in accordance with manufacturer's instructions where specified herein or indicated on the Drawings.

GG. Join non-metallic conduit using cement as recommended by the manufacturer. Clean and wipe non-metallic conduit dry before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for twenty (20) minutes (minimum).

HH. All PVC coated conduit shall be installed in accordance with manufacturer’s instructions. The Contractor shall use tools that are specifically suited for coated conduit systems. The use of pipe wrenches and other such tools on PVC coated RGS conduit is prohibited. The Engineer and Owner reserve the right to reject any installation of coated conduit that does not meet the requirements of the Section or the manufacturer’s instructions. The Engineer and Owner also reserve the right to reject any installation that exhibits damage due to the improper use of tools. All rejected installations shall be replaced by the Contractor at no additional cost to the Owner. The use of PVC coated conduit repair compounds to repair damages or improper installation is prohibited.

II. All Contractor personnel that install PVC coated RGS conduit shall be trained by the PVC coated RGS conduit manufacturer. Training shall include proper conduit system assembly techniques, use of tools appropriate for coated conduit systems, and field bending/cutting/threading of coated conduit. The Contractor shall furnish evidence of such training as specified herein. Training shall have been completed within the past 24 months prior to the Notice to Proceed on this Contract for all coated conduit installation personnel. Contractor personnel not trained within this timeframe shall not be allowed to install coated conduit, or shall be trained/re-trained as required prior to commencement of conduit installation.

JJ. Conduits shall not penetrate the floors or walls inside liquid containment areas unless specifically accepted by the Engineer.

KK. All conduits that are buried or encased in concrete that transition from the ground to any stationary structure or equipment shall be equipped with a longitudinal expansion coupling capable of at least four inches of expansion. Conduits with

encasement that is rigidly tied to the stationary structure in accordance with the Standard Details shall not be required to have expansion couplings.

LL. Raceways shall not be installed concealed in water-bearing walls and floors.

3.02 CONDUIT USES AND APPLICATIONS

A. Schedule 80 PVC conduit shall be installed where conduit is exposed in chemical storage and transfer areas. No PVC conduit shall be installed exposed in any other area unless specifically accepted in writing by the Engineer.

B. PVC Schedule 40 conduit shall be furnished and installed in concrete slabs (for slab-on-grade construction) and in walls when the conduit is shown to be encased. Rigid steel conduit shall be installed in all elevated slabs when the conduits are shown to be encased.

C. PVC Schedule 40 conduit shall be installed in reinforced concrete encasement. Conduit shall be "direct buried" only if specifically indicated on the Drawings.

D. All instrumentation wire and cable for analog signals shall be installed in rigid steel conduit or PVC coated rigid steel conduit to suit the application. This applies to all conduit installations including exposed, concealed in concrete encasement, and all other applications.

E. PVC coated rigid steel conduit shall be furnished and installed, where exposed, in the following areas:
   1. All outdoor locations.
   2. Site Vaults

F. Electrical metallic tubing may be furnished and installed in the following areas:
   1. Above reflected ceilings for lighting circuits.
   2. Within interior walls constructed of metal studs and gypsum wall board.

G. Liquid-tight flexible non-metallic conduit (LFNC) shall be furnished and installed, where required, in chemical storage and transfer areas.

H. Other conduit uses not specifically listed above shall be brought to the attention of Engineer for a decision.

END OF SECTION

SECTION 26 05 33.19

BOXES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Outlet boxes.

B. Pull and junction boxes.

1.02 RELATED SECTIONS

A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
   1. Electrical Identification
   2. Wiring Devices

1.03 REFERENCES

A. ANSI/NEMA FB 1 – Fittings and Supports for Conduit and Cable Assemblies

B. ANSI/NFPA 70 – National Electrical Code

C. NEMA 250 – Enclosures for Electrical Equipment (1000 Volts Maximum)

D. UL 514A – Metallic Outlet Boxes

E. UL 514C – Standard for Non-metallic Outlet Boxes, Flush Device Boxes, and Covers

F. UL 50 – Enclosures for Electrical Equipment, Non-environmental Considerations

G. UL 50E – Enclosures for Electrical Equipment, Environmental Considerations

1.04 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. or other North Carolina recognized third party testing agency.

1.05 SUBMITTALS

A. Product data: Provide for each type of box used.

1.06 IDENTIFICATION

A. Each pull and junction box shall be identified with the box name as indicated on the Contract Drawings (e.g. CPB-ROFP-1) or as directed by the Engineer. A nameplate shall be securely affixed in a conspicuous place on each box. Nameplates shall be as specified in Section 16195, Electrical – Identification.

PART 2 PRODUCTS

2.01 PULL AND JUNCTION BOXES

A. General
   1. All pull and junction boxes shall be UL listed and labeled.

2. Pull and junction boxes shall not be provided with eccentric or concentric knockouts.
3. Pull and junction boxes mounted embedded in concrete shall be UL listed for embedment.
4. Where metallic boxes are used they shall be of all welded construction.

B. Pull Boxes
1. All Pull boxes shall be provided with a matching gasketed cover. For covers with dimensions of 24 inches by 24 inches or less, the cover shall be held in place by machine screws. For covers with dimensions greater than 24 inches by 24 inches, the cover shall be hinged and held in place by screw-operated clamp mechanisms. Hinge pins shall be removable. Clamp mechanism material of construction shall match that of the associated box.
2. Pull boxes shall not have any wire terminations inside, other than those for grounding/bonding. A ground bar shall be provided with the necessary number of screw type terminals. Twenty percent of the total amount of terminals otherwise required for the pull box (minimum of two) shall be provided as spare terminations. Boxes requiring any other wire terminations shall be furnished and installed in accordance with the requirements for junction boxes herein.
3. Pull boxes shall be 6 inches wide by 6 inches tall by 4 inches deep, minimum. For applications requiring larger boxes, the box shall be sized in accordance with the fill requirements and dimensional requirements of the NEC.
4. Barriers shall be provided in pull boxes to isolate conductors of different voltages, types, and functions. Barrier material of construction shall match that of the box. Isolations shall be provided between the following groups:
   a. Power wiring
   b. AC control wiring
   c. DC control wiring
   d. Instrumentation wiring

C. Junction Boxes
1. Junction boxes used for lighting and receptacle circuits only shall be provided with matching gasketed cover held in place by machine screws.
2. Junction boxes for all uses other than lighting and receptacle circuits shall be provided with a hinged, gasketed cover. Hinge pins shall be removable. Cover shall be held in place by screw-operated clamp mechanisms. Clamp mechanism material of construction shall match that of the associated box.
3. Barriers shall be provided in pull boxes to isolate conductors of different voltages, types, and functions. Barrier material of construction shall match that of the box. Isolations shall be provided between the following groups:
   a. Power wiring
   b. AC control wiring
   c. DC control wiring
   d. Instrumentation wiring
4. Junction boxes used for lighting and receptacle circuits only shall be allowed to have screw-on (wire nut) type connectors for wire terminations/junctions.
5. Junction boxes for all uses other than lighting and receptacle circuits shall be provided with terminal strips, consisting of the necessary number of screw type terminals. Current carrying parts of the terminal blocks shall be of ample capacity to carry the full load current of the circuits connected, with a 10A minimum capacity. Terminal strips shall be rated for the voltage of the circuits connected. A separate ground bar shall be provided with the necessary number of screw type terminals. Twenty percent of the total amount of the terminals

otherwise required for the junction box (minimum of two) shall be provided as spare terminations. When barriers are provided within the box, separate terminal strips shall be provided in each barrier area.

6. Junction boxes shall be 6 inches wide by 6 inches tall by 4 inches deep, minimum. For applications requiring larger boxes, the box shall be sized in accordance with the fill requirements and dimensional requirements of the NEC. Terminal blocks (including spare terminals) shall be considered when sizing the junction box.

D. Enclosure Types and Materials

1. In non-hazardous locations, pull and junction boxes shall be furnished with the following enclosure type and material of construction, dependent upon the designation of the area in which they are to be installed.
   a. Indoor Wet Process Area – NEMA 4X, Type 304 Stainless Steel
   b. Indoor Dry Process Area – NEMA 12, Painted Steel
   c. Indoor Dry Non-process Area – NEMA 1, Painted Steel
   d. Indoor Chemical Storage/Transfer Area – NEMA 4X, Type 304 Stainless Steel
   e. All Outdoor Areas – NEMA 4X, Type 304 Stainless Steel
2. In hazardous locations, pull and junction boxes shall be furnished with the following enclosure type and material of construction, dependent upon the classification of the area in which they are to be installed. Area classifications are indicated on the Drawings.
   a. Class 1, Division 1, Group D – NEMA 7, Die Cast Aluminum
   b. Class 1, Division 2, Group D – NEMA 4X, Type 304 Stainless Steel
   c. Class 2, Division 1, Group F – NEMA 9, Die Cast Aluminum
   d. Class 2, Division 2, Group F – NEMA 4X, Type 304 Stainless Steel
3. Non-metallic enclosures, NEMA 7 enclosures, and NEMA 9 enclosures shall be provided with threaded integral conduit hubs.

2.02 OUTLET BOXES

A. General

1. Outlet boxes shall be provided with a trim appropriate for the wiring device installed inside. Reference Section 16140, Wiring Devices, for outlet box trim requirements. An appropriate outlet box trim is required to achieve the NEMA rating of the outlet boxes as specified herein.

B. Surface Mount Outlet Boxes

1. Outlet boxes shall be the deep type, no less than 2.5 inches deep.
2. Outlet boxes shall be provided in single or multi-gang configuration as required, sized in accordance with the requirements of the NEC.
3. In non-hazardous locations, outlet boxes shall be furnished with the following enclosure type and material of construction, dependent upon the designation of the area in which they are to be installed.
   a. Indoor Wet Process Area – NEMA 4X, Cast Aluminum
   b. Indoor Dry Process Area – NEMA 1, Cast Aluminum
   c. Indoor Dry Non-process Area – NEMA 1, Cast Aluminum
   d. Indoor Chemical Storage/Transfer Area – NEMA 4X, Cast Aluminum
   e. All Outdoor Areas – NEMA 4X, Cast Aluminum
4. In hazardous locations, outlet boxes shall be furnished with the following enclosure type and material of construction, dependent upon the classification of the area in which they are to be installed. Area classifications are indicated on the Drawings.

a. Class 1, Division 1, Group D – NEMA 7, Die Cast Aluminum
b. Class 1, Division 2, Group D – NEMA 4X, Cast Aluminum
c. Class 2, Division 1, Group F – NEMA 9, Die Cast Aluminum
d. Class 2, Division 2, Group F – NEMA 4X, Cast Aluminum

5. Outlet boxes shall be provided with integral threaded conduit hubs mounted external to the box. Boxes with threaded conduit hubs mounted internal to the box or as part of the box wall are not acceptable.

C. Flush Mount Outlet Boxes
1. Outlet boxes shall be no less than 2-1/8 inches deep, and 4-11/16 inches square. Boxes shall be UL listed and labeled. Pre-punched single diameter conduit knockouts are acceptable; however, concentric and eccentric knockouts are not acceptable.
2. Outlet boxes mounted flush in CU walls shall be made of galvanized, tack welded steel, and suitable for installation in masonry walls. Sectional type boxes are not acceptable for this application.
3. Outlet boxes mounted flush in gypsum walls shall be made of galvanized pressed steel. Tack welded boxes or sectional type boxes are not acceptable for this application.
4. Outlet boxes mounted cast into concrete shall be concrete tight, and shall be made of galvanized steel or PVC.

PART 3 EXECUTION

3.01 INSTALLATION

A. Pull and Junction Boxes
1. Pull boxes and junction boxes shall be solidly attached to structural members prior to installation of conduit and set true and plumb. Boxes shall not be supported by their associated conduits.
2. Wooden plugs are not permitted for securing boxes to concrete. Appropriately rated anchors specifically suited for use in concrete shall be used.
3. Box penetrations for conduits shall be made with a punch tool, and penetrations shall be the size required for the conduit entry and/or hub. Oversized penetrations in boxes are not acceptable.
4. Watertight conduit hubs shall be provided for boxes where a NEMA 4X enclosure rating is specified. Referenced Section 16130, Conduit, for conduit hub requirements.
5. Pull and junction boxes may be installed flush mounted in gypsum, concrete, or CMU walls where appropriate provided that covers are easily removed or opened.
6. Pull and junction boxes shall be provided in the enclosure type and material of construction required for the area in which it is installed. Reference the requirement in Part 2 herein.

B. Outlet Boxes
1. Outlet boxes shall be solidly attached to structural members prior to installation of conduit and set true and plumb. Boxes shall not be supported by their associated conduits.
2. Wooden plugs are not permitted for securing boxes to concrete. Appropriately rated anchors specifically suited for use in concrete shall be used.
3. Flush mounted outlet boxes shall be arranged and located so that tile and grout lines fit closely around the boxes, and so placed that the cover or device plate

shall fit flush to the finished wall surface.

4. Outlet boxes shall be flush mounted in finished areas and other areas where practical. Flush mounted outlet boxes shall not be installed in hazardous areas or chemical storage/transfer areas.
5. For the below-named items, mounting heights from finished floor, or finished grade to top is applicable, depending on the type of wiring device to be installed in the outlet box. Mounting heights for outlet boxes shall be as follows, unless otherwise specified herein, indicated on the Drawings, or required by the Americans with Disability Act (ADA):
   a. Light switches and wall mounted occupancy sensors, 48 inches
   b. Receptacles in indoor dry process/non-process areas, 16 inches
   c. Receptacles in indoor wet process areas and all indoor chemical storage/transfer areas, 48 inches
   d. Receptacles in outdoor locations, 24 inches
6. Outlet boxes shall be provided in the material of construction required for the area in which it is installed. Reference the requirements in Part 2 herein.

END OF SECTION

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SECTION 26 05 53.03

ELECTRICAL IDENTIFICATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Wire color coding.

C. Cable markers.

D. Conduit

1.02 REFERENCES

A. ANSI/NFPA 70 - National Electrical Code.

1.03 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

PART 2 PRODUCTS

2.01 NAMEPLATES

A. Nameplates: Engraved laminated phenolic. Edges shall be chamfered. Minimum size shall be 1 inch high by 2.5 inches wide. Identify equipment (or equipment served) and location of supply side overcurrent protective device.

B. Locations:
   1. Each electrical distribution, control equipment, and special system enclosure.

C. Letter Size: ¼ inch high.

D. Color:
   1. Blue surface with white letters for 208Y/120 volt equipment.
   2. Black surface with white core.

E. Nameplates shall be attached to NEMA 4X enclosures utilizing UL-recognized mounting kits designed to maintain the overall UL Type rating of the enclosure. Mounting kit fasteners shall be stainless steel Type AHK10324X as manufactured by Hoffman, or equal.

2.02 HIGH VOLTAGE SIGNS

A. Standard "DANGER" signs shall be of baked enamel finish on 20 gage steel; of standard red, black and white graphics; 14 inches by 10 inches size except where 10 inches by 7 inches is the largest size which can be applied where needed, and except where a larger size is needed for adequate identification.

2.03 WARNING SIGNS

A. Equipment Containing Voltage from Multiple Sources: A phenolic sign with engraved lettering shall be mounted on or adjacent to the apparent disconnecting means stating “WARNING. PARTS OF THE CONTROLLER (OR OTHER EQUIPMENT) ARE NOT DE-ENERGIZED BY THIS SWITCH”.

2.04 WIRE COLOR CODING

A. Conductors shall be identified using a color coding method. Color coding for individual power, control, lighting, and receptacle conductors shall be as follows:
   1. 480/277V AC Power
      a. Phase A - BROWN
      b. Phase B - ORANGE
      c. Phase C - YELLOW
      d. Neutral - GREY
   2. 120/208V or 120/240V AC Power
      a. Phase A - BLACK
      b. Phase B - RED
      c. Phase C - BLUE
      d. Neutral - WHITE
   3. DC Power
      a. Positive Lead - RED
      b. Negative Lead - BLACK
   4. DC Control
      a. All wiring - BLUE
   5. 120 Vac Control
      a. 120 Vac control wire shall be RED except for a wire entering a motor control center compartment or control panel which is an interlock. This interlock conductor shall be color coded YELLOW
      b. 24 Vac Control
      c. All wiring - ORANGE
   6. Equipment Grounding Conductor
      a. All wiring – GREEN

B. Individual conductors No. 2 AWG and smaller shall have factory color coded insulation. It is acceptable for individual conductors larger than No.2 AWG to be provided with factory color coded insulation as well, but it is not required. Individual conductors larger than No.2 AWG that are not provided with factory color coded insulation shall be identified by the use of colored tape in accordance with the requirements listed in Part 3 herein. Insulation colors and tape colors shall be in accordance with the color coding requirements listed above.

C. Conductors that are a part of multi-conductor control cable assemblies shall have black insulation. The conductor number shall be printed on each conductor's insulation in accordance with ICEA S-58-679, Method 4. Each conductor within the cable assembly shall also be identified with a heat shrink tag with color coded background in accordance with the requirements listed in Part 3 herein. Background color shall be in accordance with the color coding requirements listed above.

D. Conductors that are a part of multi-conductor power cable assemblies shall have black insulation. The conductor number shall be printed on each conductor's insulation in accordance with ICEA S-58-679, Method 4. Each conductor No.2 AWG and smaller within the cable assembly shall also be identified with a heat shrink tag with color coded background. Each conductor larger than No.2 AWG within the cable assembly shall also be identified by the use of colored tape. Heat shrink tags and colored tape shall be in accordance with the requirements listed in Part 3 herein. Tape color and heat shrink tag background color shall be in accordance with the color coding requirements listed above.

2.05 BOX IDENTIFICATION

A. Pull, junction, and device box identification shall be as specified in Section 16136 – Boxes.

2.06 UNDERGROUND WARNING TAPE

A. Manufacturers:
   1. Seton Name Plate Co.
   2. Thomas & Betts
   3. 3M Electrical Products Div.

B. Description: 4-inch wide tape, detectable type, colored red for power and orange for telephone with suitable warning legend describing buried electric or telephone lines below.

PART 3 EXECUTION

3.01 APPLICATION

A. Install nameplate parallel to equipment lines.

B. Nameplates shall be attached to the equipment enclosures with (2) two stainless steel sheet metal screws for nameplates up to 2-inches wide. For nameplates over 2-inches wide, four (4) stainless steel sheet metal screws shall be used, one (1) in each corner of the nameplate. The utilization of adhesives is not permitted.

C. Identify underground conduits using underground warning tape. Install one tape per trench at 12 inches above duct bank or direct buried conduit.

D. All empty conduit runs and conduit with conductors for future use shall be identified for use and shall indicate where they terminate. Identification shall be by tags with string or wire attached to conduit or outlet.

3.02 POWER SOURCE IDENTIFICATION

A. After installation of all field equipment (i.e. valves, motors, fans, unit heaters, instruments, etc) install nameplates at each power termination for the field equipment. Nameplate data shall include equipment designation (tag number), power source (MCC number, panelboard, etc), circuit number, conduit number from schedule and voltage/phase.

B. Contractor to coordinate with the Engineer and the Owner regarding exact nameplate placement during construction.

C. Nameplates shall be as specified herein.

3.03 CONDUCTOR IDENTIFICATION

A. In addition to the color coding identification requirements specified in Part 2 herein, individual conductors shall be provided with heat shrinkable identification tags. Identification tags for individual conductors shall have a white background where the conductor insulation is colored. Identification tags for individual conductors shall have a colored background where the conductor insulation is black. Background color shall match that of the taping provided on the individual black conductors.

B. Multi-conductor cables shall be provided with heat shrinkable identification tags in accordance with Part 2 herein.

C. All wiring shall be identified at each point of termination. This includes but is not limited to identification at the source, load, and in any intermediate junction boxes where a termination is made. The Contractor shall meet with the Owner and Engineer to come to an agreement regarding a wire identification system prior to installation of any wiring. Wire numbers shall not be duplicated.

D. Wire identification shall be by means of a heat shrinkable sleeve with appropriately colored background and black text. Wire sizes #14 AWG through #10 AWG shall have a minimum text size of 7 points. Wire sizes #8 AWG and larger shall have a minimum text size of 10 points. Sleeves shall be of appropriate length to fit the required text. The use of handwritten text for wire identification shall not be permitted.

E. Sleeves shall be suitable for the size of wire on which they are installed. Sleeves shall not be heat-shrunk onto control cables. Tags shall remain loose on cable to promote easier identification. For all other applications, sleeves shall be tightly affixed to the wire and shall not move. Sleeves shall be heat shrunk onto wiring with a heat gun approved for the application. Sleeves shall not be heated by any means which employs the use of an open flame. The Contractor shall take special care to ensure that the wiring insulation is not damaged during the heating process.

F. Sleeves shall be installed prior to the completion of the wiring terminations and shall be oriented so that they can be easily read.

G. Sleeves shall be polyolefin as manufactured by Brady, Seton, Panduit, or equal.

H. Wire identification in manholes, handholes, pull boxes, and other accessible components in the raceway system where the wiring is continuous (no terminations are made) shall be accomplished by means of a tag installed around the bundled group of individual conductors or around the outer conductor jacket of a multi-conductor cable. Identification shall utilize a FROM-TO system. Each group of conductors shall consist of all of the individual conductors in a single conduit or duct. The tag shall have text that identifies the bundle in accordance with the 'FROM' and 'TO' column for that particular conduit number in the conduit and wire schedule. Minimum text size shall be 10 point. The tag shall be affixed to the wire bundle by the use of nylon wire ties, and shall be made of polyethylene as manufactured by Brady, Seton, Panduit, or equal.

I. Where colored tape is used to identify cables, it shall be wrapped around the cable with a 25% overlap and shall cover at least 2 inches of the cable.

3.04 CONDUIT IDENTIFICATION

A. Exposed conduits shall be identified at the source, load, and all intermediate components of the raceway system. Examples of intermediate components include but are not limited to junction boxes, pull boxes, condulets, and disconnect switches. Identification shall be by means of an adhesive label with the following requirements:
   1. Labels shall consist of an orange background with black text. Text for the label shall be the conduit number as indicated in the conduit and wire schedules.
   2. In addition, at the source end of the conduit, a second line of text shall be included to indicate the load equipment name. This second line shall consist of the word "TO:" and the text in the 'TO' column of the conduit and wire schedule (e.g. TO: Raw Sewage Pump No. 1). At the load end of the conduit, a second line of text shall be included to indicate the source equipment name. This

second line shall consist of the word “FROM:” and the text in the ‘FROM’ column of the conduit and wire schedule (e.g. FROM: MCC-SPS). This requirement applies only to the source and load ends of the conduit, and not anywhere in between.

3. For conduits ¾” through 1½” in size, the text shall be a minimum 18 point font. For conduits 2” and larger, the text shall be a minimum 24 point font.
4. Label height shall be ¾” minimum, and length shall be as required to fit required text. The label shall be installed such that the text is parallel with the axis of the conduit. The label shall be oriented such that the text can be read without the use of any special tools or removal of equipment.
5. Labels shall be installed after each conduit is installed and, if applicable, after painting. Labels shall be printed in the field via the use of a portable label printing system. Handwritten labels are not acceptable.
6. Labels shall be made of permanent vinyl with adhesive backing as manufactured by Brady, Seton equivalent, Panduit equivalent, or equal. Labels made of any other material are not acceptable.

B. Conduits that are not exposed but installed beneath free standing equipment enclosures shall be identified by means of a plastic tag with the following requirements:
   1. The tag shall be made of white Tyvek material, and have an orange label with black text, as described above, adhered to it. Text for the label shall be the conduit number as indicated in the conduit and wire schedules.
   2. The tag shall be affixed to the conduit by means of a nylon cable tie. The tag shall be of suitable dimensions to achieve a minimum text size of 18 points.
   3. Tags shall be White Tyvek as manufactured by Brady, Seton equivalent, Panduit equivalent, or equal.

C. Conduits for lighting and receptacle circuits shall not require identification.

D. Alternatives to this proposed conduit identification method shall be submitted to the Engineer as part of the shop drawing submittal.

E. Any problems or conflicts with meeting the requirements above shall immediately be brought to the attention of the Engineer for a decision.

END OF SECTION

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SECTION 26 09 16.03

CONTROLS AND RELAYS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pushbutton and selector switches.

B. Control stations.

C. Relays.

D. Time delay relays.

E. Control power transformers.

F. Control panels.

1.02 RELATED SECTIONS

A. Section 16137 – Cabinets and Enclosures.

1.03 REFERENCES

A. NEMA ICS 1 - General Standards for Industrial Control Systems.

B. NEMA ICS 2 - Standards for Industrial Control Devices, Controllers and Assemblies.

C. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.

D. NEMA ST 1 - Standard for Specialty Transformers (Except General Purpose Type).

1.04 SUBMITTALS

A. Submit shop drawings under provisions of Division 1.
   1. Submit shop drawings to NEMA ICS 1 indicating control panel layouts, wiring connections and diagrams, dimensions, support points.
   2. Submit product data under provisions of Division 1.
   3. Submit product data for each component specified.

1.05 PROJECT RECORD DOCUMENTS

A. Submit record documents under provisions of Division 1.

B. Accurately record actual locations of control equipment. Revise diagrams included in Drawings to reflect actual control device connections.

1.06 OPERATION AND MAINTENANCE DATA

A. Submit operation data under provisions of Division 1.

B. Include instructions for adjusting and resetting time delay relays, timers, and counters.

C. Submit maintenance data under provisions of Division 1.

D. Include recommended preventive maintenance procedures and materials.

1.07 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three years' experience.

PART 2 PRODUCTS

2.01 CONTROL COMPONENTS

A. Manufacturers
   1. Control components shall be manufactured by Eaton, The Square D Company, General Electric, Allen-Bradley, Siemens Energy and Automation, or Engineer approved equal.

B. Pilot Devices
   1. General
      a. All pilot devices shall be provided with a legend plate. Legend plates shall have a white background and black lettering and indicate the function of the respective pilot device. The text shown on the Drawings or indicated in the specifications shall be used as the basis for legend plate engraving (i.e. HAND-OFF-AUTO, RUN, EMERGENCY STOP, etc).
      b. All pilot devices shall be selected and properly installed to maintain the NEMA 250 rating of the enclosure in which they are installed. All pilot devices shall be UL 508 Listed.
      c. All pilot devices shall be 30.5mm in diameter, unless otherwise indicated. 22mm devices are not acceptable.
      d. Pilot devices for all electrical equipment under this Contract shall be of the same type and manufacturer unless otherwise specified herein or indicated on the Drawings.
      e. In Class 1 Division 2 hazardous locations, pilot devices shall be the hermetically-sealed type, constructed in accordance with ANSI/ISA 12.12.01.
   2. Pushbuttons
      a. Pushbuttons shall be non-illuminated, black in color, and have momentary style operation unless otherwise indicated on the Drawings.
      b. Pushbuttons shall have the quantity of normally closed and/or normally open contacts as indicated on the Drawings and as required. In addition to the required contacts, one (1) spare normally open and one (1) spare normally closed contact shall be installed at each pushbutton. Contacts shall be rated for 5A at 250VAC/DC (minimum), but no less than required for the application.
      c. Pushbuttons shall be provided with a full guard around the perimeter of the button. Where a lockout style pushbutton is specified or indicated on the Drawings, provide a padlockable guard.
   3. Selector Switches
      a. Selector switches shall be non-illuminated, black in color, and have the number of maintained positions as indicated on the Drawings and as required. Handles shall be the extended type that provide a greater surface area for operation.
      b. Selector switches shall have the quantity of normally closed and/or normally open contacts as indicated on the Drawings and as required. In addition to the required contacts, one (1) spare normally open and one (1)

spare normally closed contact shall be installed at each selector switch. Contacts shall be rated for 5A at 250VAC/DC (minimum), but no less than required for the application.

c. Where indicated in the Drawings or Specifications, provide spring return positions.

d. Selector switches shall be provided with an indexing component that fits into the keyed portion of the cutout for the device and prevents the switch from spinning when operated.

4. Indicating Lights

a. Indicating lights shall LED type, with the proper voltage rating to suit the application, and push-to-test feature.

b. Indicating light lens colors shall be as required in equipment specifications and/or as indicated on the Drawings. If lens colors are not indicated, the following colors shall be used:

1) "Run", "On", “Open”
2) "Off", “Closed”
3) "Alarm", "Fail"
4) “Control Power On”

5. Emergency Stop and Tagline Switches

a. Emergency stop switches shall be non-illuminated, red in color, with a minimum 35mm diameter mushroom head. Once activated, switch shall maintain its position and require a manual pull to release/reset.

b. Tagline switches shall have a plunger that activates upon tension from the associated safety cable. Once activated, switch shall maintain its position and require a manual release/reset.

c. Emergency stop and tagline switches shall have the quantity of normally closed and/or normally open contacts as indicated on the Drawings and as required. In addition to the required contacts, one (1) spare normally open and one (1) spare normally closed contact shall be installed at each switch. Contacts shall be rated for 5A at 250VAC/DC (minimum), but no less than required for the application.

C. Relays and Timers

1. General

a. Relays and timers shall be furnished with an integral pilot light for positive indication of coil energization.

b. Relays and timers shall have tubular pin style terminals with matching 11-pin DIN rail mount socket. Spade or blade style terminals are not acceptable.

c. Relays and timers for all electrical equipment under this Contract shall be of the same type and manufacturer unless otherwise specified herein or indicated on the Drawings.

2. Control and Pilot Relays

a. Miniature or “ice-cube” type relays are not acceptable.

b. Relays shall have coil voltage as required to suit the application and/or as indicated on the Drawings.

c. Relays shall be provided with contacts rated for 10A (resistive), minimum, at 120/240 VAC and 28 VDC. Relays shall have 3-pole, double-throw (3PDT) contact arrangement.

3. Time Delay Relays

a. Timers delay relays shall utilize electronic timing technology. Mechanical timing devices are not acceptable.

b. Relays shall have coil voltage as required to suit the application and/or as indicated on the Drawings.
c. Relays shall be provided with contacts rated for 10A (resistive), minimum, at 120/240 VAC and 28 VDC. Relays shall have double-pole double-throw (DPDT) contact arrangement.
d. Time delay ranges shall be as indicated on the Drawings and/or as required to suit the application. Timing range shall be adjustable from the front of the relay. On delay and off delay timer configurations shall be provided as indicated on the Drawings and/or as required to suit the application.

4. Elapsed Time Meters
   a. Elapsed time meters shall be non-resettable type with no less than a 4 digit display. Coil voltage shall be as required to suit the application and/or as indicated on the Drawings.

D. Control Terminal Blocks
1. Control terminal blocks shall be assembled on non-current carrying galvanized steel DIN mounting rails securely bolted to the enclosure or subpanel. Terminals shall be tubular screw type with pressure plate that will accommodate wire size range of #22 - #8 AWG.
2. Control terminal blocks shall be single tier with a minimum rating of 600 volts and 20A. Separate terminal strips shall be provided for each type of control used (i.e. 120VAC vs. 24VDC). Quantity of terminals shall be provided as required to suit the application. In addition, there shall be a sufficient quantity of terminals for the termination of all spare conductors.
3. Terminals shall be marked with a permanent, continuous marking strip, with each terminal numbered. One side of each terminal shall be reserved exclusively for incoming field conductors. Common connections and jumpers required for internal wiring shall not be made on the field side of the terminal.

2.02 LOCAL CONTROL STATIONS

A. Local control stations shall be furnished and installed complete with pushbuttons, selector switches, indicating lights, and other devices as indicated on the Drawings.

B. Specific devices installed in local control stations shall be provided in accordance with the requirements specified elsewhere in this Section.

C. In non-hazardous locations, local control stations shall be furnished with the following enclosure type and material of construction, dependent upon the designation of the area in which they are to be installed. Area designations are indicated on the Drawings.
1. Indoor Wet Process Area – NEMA 4X, Type 304 Stainless Steel
2. Indoor Dry Process Area – NEMA 12, Painted Steel
3. Indoor Dry Non-process Area – NEMA 1, Painted Steel
4. Indoor Chemical Storage/Transfer Area – NEMA 4X, Type 304 Stainless Steel
5. All Outdoor Areas – NEMA 4X, Type 304 Stainless Steel

D. Non-metallic enclosures, NEMA 7 enclosures, and NEMA 9 enclosures shall be provided with threaded integral conduit hubs. Conduit hubs shall be external to the enclosure.

E. Local control stations for use in non-hazardous locations shall be UL-508 Listed. Local control stations for use in Class 1 Division 1 and Class 2 Divisions 1/2 hazardous locations shall be UL-1203 Listed. Local control stations for use in Class

1 Division 2 hazardous locations shall be in accordance with ANSI/ISA 12.12.01-2013.

F. Provide a nameplate on each local control station in accordance with Section 16075, Electrical Identification. The name and/or number of the equipment associated with each control station shall be engraved on the nameplate, followed by the words “LOCAL CONTROL STATION”.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install devices and equipment in accordance with manufacturer's instructions.

B. Make electrical wiring interconnections as shown on Drawings.

C. Local control stations shall be provided in the enclosure type and material of construction required for the area in which it is installed. Reference the requirements in Part 2 herein, and the area designations indicated on the Drawings.

D. All control components shall be mounted in a manner that will permit servicing, adjustment, testing, and removal without disconnecting, moving, or removing any other component. Components mounted on the inside of panels shall be mounted on removable plates and not directly to the enclosure. Mounting shall be rigid and stable unless shock mounting is required otherwise by the manufacturer to protect equipment from vibration. Component's mounting shall be oriented in accordance with the component manufacturer's and industries' standard practices.

E. Pilot devices shall be properly bonded to the equipment enclosure door where they are installed. If proper bonding cannot be achieved through the locknuts that affix the device in place, a green colored bonding screw shall be provided on the pilot device. The bonding screw shall be bonded to the equipment enclosure through the use of an insulated green bonding conductor.

F. Local control station covers shall be bonded to the local control station enclosure through the use of an insulated green bonding conductor.

G. Wiring to devices at each local control station shall be provided with enough slack to permit the local control station cover to be removed and pulled at least 6 inches away from the enclosure.

END OF SECTION

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SECTION 26 21 00.03

UTILITY SERVICE ENTRANCE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Utility Coordination Requirements

1.02 RELATED SECTIONS

A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
   1. Trenching for Utilities.
   2. Cast-in-Place Concrete.
   3. Grounding and Bonding.
   4. Conduit.
   5. Duct Bank.

1.03 REFERENCES

A. NECA Standard of Installation

B. ANSI/NFPA 70 - National Electrical Code.

1.04 SYSTEM DESCRIPTION

A. Utility Company: Duke Energy

B. System Characteristics: 120/240 volts, 1 phase, 3 wire, 60 hz.

1.05 SUBMITTALS

A. Submit the following in accordance with Division 1:
   1. Catalog Data: Submit manufacturer's standard drawings or catalog cuts for the following.
      a. Meter bases.
   2. Manufacturer's installation instructions.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with Utility Company requirements.

1.07 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI / NFPA 70.

1.08 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on the Drawings.

1.09 REQUIREMENT

A. The Contractor shall examine the site and become familiar with conditions affecting the work. The Contractor shall investigate, determine, and verify locations of any overhead or buried utilities on or near the site, and shall determine such locations in conjunction with all public and/or private utility companies and with all authorities having jurisdiction. All costs, both temporary and permanent to connect all utilities, shall be included in the Bid. The Contractor shall be responsible for scheduling and

coordinating with the local utility for temporary and permanent services.

B. The Contractor is responsible for coordinating all electric utility equipment installations with the serving electric utility. The Contractor shall furnish and install all electric utility equipment required by the electric utility to be installed by the Contractor whether specifically shown on the Drawings or not. The Contractor shall furnish and install the following electrical utility equipment as a minimum:
   1. Concrete transformer pads constructed as instructed by the electric utility
   2. Primary and or secondary ductbank and manholes
   3. Metering equipment cabinets and/or bases
   4. Conduit and wire required from metering cabinet to metering current transformers and potential transformers
   5. Secondary conductors
   6. Secondary terminations
      a. The electric utility will furnish and install the following equipment:
   7. Primary conductors and terminations

C. The Contractor is responsible for ensuring all electric utility equipment and construction installed by the Contractor is furnished and installed in accordance with the electric utility's design specifications and requirements. The Contractor is fully responsible for coordinating his scope of work with the electric utility. Any additional required electric utility construction or equipment not specified herein or shown on the Drawings shall be supplied by the Contractor at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 NOT USED

PART 3 EXECUTION

3.01 PREPARATION

A. Provide temporary electric service in conformance with requirements of Section 01500, Temporary Facilities.

B. Obtain permanent electric service to the facility in a timely manner to meet the requirements of the construction schedule. Establish account with Utility in Owner's name. Contractor shall not use the permanent electric service for construction of project. Permanent electric service shall only be used for testing of equipment after installation. All usage fees acquired during testing by the Contractor from the Utility shall be paid for by the Contractor until the point of substantial completion has been obtained. Once substantial completion is obtained, the Owner shall then pay for usage fees. All fees from the Utility in regards to establishing a physical permanent electric service to the site shall be paid for by the Owner, separate from this Contract.

C. Coordinate location of Utility Company's facilities to ensure proper access is available.

3.02 INSTALLATION

A. Install the meter base in accordance with utility requirements. Coordinate with the Utility and Owner for location of meter base. Furnish and install necessary mounting as required.

B. Provide and install Schedule 80 PVC conduit from utility power pole below grade to new meter base with pull string. Coordinate size of conduit and routing of conduit with utility company. Install in strict accordance with utility standards.

C. Provide service from load side of meter to service equipment.

END OF SECTION

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SECTION 26 22 00.03

DRY TYPE TRANSFORMERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Dry type two winding transformers.

B. Small integral transformers and branch circuit panels.

1.02 RELATED SECTIONS

A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
   1. Cast-in-Place Concrete.
   2. Grounding and Bonding.
   3. Supporting Devices.
   4. Conduit: Flexible conduit connections.

1.03 REFERENCES

A. NEMA ST 1 - Specialty Transformers

B. NEMA ST 20 - Dry Type Transformers for General Applications.

C. NFPA 70 - National Electrical Code.

1.04 SUBMITTALS

A. Submit under provisions of Division 1.
   1. Product Data: Provide outline and support point dimensions of enclosures and accessories, unit weight, voltage, KVA, and impedance ratings and characteristics, tap configurations, insulation system type, and rated temperature rise.
   2. Test Reports: Indicate loss data, efficiency at 25, 50, 75 and 100 percent rated load, and sound level.

1.05 OPERATION AND MAINTENANCE

A. Submit under provisions of Division 1.

B. Maintenance Data: Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with NECA Standard of Installation.

B. Maintain one copy of each document on site.

1.07 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

B. Furnish products listed and classified by UL or other North Carolina Recognized Third Party Testing Agency

1.08 DELIVERY, STORAGE, AND HANDLING

A. Store, protect, and handle products to site under provisions of Division 1.

B. Deliver transformers individually wrapped for protection and mounted on shipping skids.

C. Accept transformers on site. Inspect for damage.

D. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

E. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The equipment covered by this Specification is intended to be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.

B. Dry type distribution transformers shall be Energy Star compliant and manufactured by the Square D Company, the General Electric Company, Eaton, or Siemens Energy and Automation, Inc.

2.02 DRY TYPE TRANSFORMERS

A. Furnish and install single-phase and three-phase general purpose, dry-type transformers, as specified herein and indicated on the Drawings. The transformers shall be 60 Hz, self cooled, quiet design insulated of the two winding type.

B. The transformers shall be UL 1561 Listed.

C. The primary windings shall be rated 480 VAC for use on 3 phase systems and connected delta unless indicated otherwise on the Drawings. KVA ratings shall be as shown on the Drawings. Furnish transformers with two 2 1/2% primary taps above, and four 2 1/2% primary taps below rated voltage for transformers 15 KVA and above, and two 2 1/2% primary taps above, and two 2 1/2% primary taps below rated voltage for transformers less than 15 kVA. All taps shall be full capacity rated.

D. The ratings of the secondary windings shall be as indicated on the Drawings.

E. Transformers shall be designed for continuous operation at rated KVA, 24 hours a day, 365 days a year, with normal life expectancy as defined in IEEE 65 and ANSI C57.96. This performance shall be obtainable without exceeding 150 degrees Celsius average temperature rise by resistance or 180 degrees Celsius hot spot temperature rise in a 40 degrees Celsius maximum ambient and 30 degrees Celsius average ambient. The maximum coil hot spot temperature shall not exceed 220 degrees Celsius. All insulating materials shall be flame retardant and shall not support combustion as defined in ASTM Standard Test Method D 635. All insulating materials shall be in accordance with NEMA ST 20 Standard for a 220 degrees Celsius UL component recognized insulation system.

F. Transformer coils shall be of the continuous wound copper construction and shall be impregnated with nonhygroscopic, thermosetting varnish.

G. All cores are to be constructed of high grade, nonaging, grain oriented silicon steel with high magnetic permeability and low hysteresis and eddy current loses. Magnetic flux densities are to be kept well below the saturation point. The core laminations shall be tightly clamped and compressed with structural steel angles. The completed core and coil shall then be bolted to the base by means of vibration absorbing mounts to minimize sound transmission. There shall be no metal to metal contact between the core and coil assembly and the enclosure.

H. All transformers shall be equipped with a wiring compartment suitable for conduit entry and large enough to allow convenient wiring. The maximum temperature of the enclosure shall not exceed 90 degrees Celsius. Transformers shall be furnished with lugs of the size and quantity required and suitable for termination of the field wiring.

I. The core of the transformer shall be visibly grounded to the enclosure by means of a flexible grounding conductor sized in accordance with applicable NEMA, IEEE, and ANSI standards.

J. Transformers shall have core and coil assemblies mounted on rubber isolation pads to minimize the sound levels. Transformers shall not exceed the sound levels listed in NEMA ST-20.

K. Transformers shall be furnished with the following enclosure type and material of construction, dependent upon the designation of the area in which they are to be installed. Area designations are indicated on the Drawings.
   1. Indoor Wet Process Area - NEMA 3R, Painted Steel
   2. Indoor Dry Process Area - NEMA 2, Painted Steel
   3. Indoor Dry Non-process Area - NEMA 2, Painted Steel
   4. All Outdoor Areas - NEMA 3R, Painted Steel

L. The enclosure shall be made of heavy gauge steel and shall be degreased, cleaned, primed, and finished with a baked weather-resistant enamel using the manufacturer’s standard painting process. Color shall be ANSI 61.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are suitable for installing transformer supports.

3.02 PREPARATION

A. Provide housekeeping pad under the provisions of Section 03100.

B. Pad shall be 4 inches thick and shall extend 4 inches beyond equipment on all sides. Provide ½ inch chamfer at top edge.

3.03 INSTALLATION

A. Install Products in accordance with manufacturer's instructions.

B. Set transformer plumb and level.

C. Use flexible conduit, under the provisions of Section 16130, 2 ft minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.

D. Provide grounding and bonding in accordance with Section 16060.

E. Install to provide clearance in front of ventilating openings as marked on equipment.

3.04 FIELD QUALITY CONTROL

A. Check for damage and tight connections prior to energizing transformer.

B. Measure primary and secondary voltages and make appropriate tap adjustments.

END OF SECTION

SECTION 26 24 16.03

PANELBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Lighting panelboards

B. Power distribution panelboards

C. Combination power units

1.02 RELATED SECTIONS

A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
   1. Grounding and Bonding
   2. Supporting Devices
   3. Electrical Identification

1.03 REFERENCES

A. NECA (National Electrical Contractors Association) - Standard of Installation.

B. NEMA AB 1 - Molded Case Circuit Breakers.

C. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies.

D. NEMA PB 1 - Panelboards.

E. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.

F. NFPA 70 - National Electrical Code.

1.04 SUBMITTALS

A. Submit under provisions of Division 1.
   1. Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker arrangement and sizes.
   2. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.05 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division 1.

B. Record actual locations of Products; indicate actual branch circuit arrangement.

1.06 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division 1.

B. Maintenance Data: Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.07 QUALITY ASSURANCE

A. Perform Work in accordance with NECA Standard of Installation.

B. Maintain one copy of each document on site.

1.08 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

B. Furnish products listed and classified by UL or other North Carolina Recognized Third Party Testing Agency.

1.09 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated.

1.10 MAINTENANCE MATERIALS

A. Provide maintenance materials under provisions of Division 1.

B. Provide two of each panelboard key.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The Equipment shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.

2.02 CONDUCTORS (MAIN BUS AND BRANCH CONNECTORS)

A. All main bus shall be copper sized in accordance with UL standards to limit the temperature rise on any current carrying part to a maximum of 50 degrees C above a maximum ambient temperature of 40 degrees C.

2.03 LIGHTING PANELBOARDS

A. General
   1. Lighting panelboards shall be dead-front type with automatic trip-free, non-adjustable, thermal-overload, branch circuit breakers. Panelboards shall be of the configuration and rating as specified herein and indicated on the Drawings. Panelboards shall be service entrance rated where indicated on the Drawings.
   2. Lighting panelboards shall be equipped with a main breaker or main lugs complete with branch circuit breakers, as indicated on the Drawings. The panelboards shall be suitable for flush or surface mounting.
   3. Lighting panelboards shall be fully rated and shall have a minimum short circuit rating of 22,000 amperes symmetrical, unless otherwise indicated on the Drawings.
   4. Lighting panelboards shall be Eaton Pow-R-Line Series, the Square D Company equivalent, the General Electric Company equivalent, or Siemens Energy and Automation, Inc. equivalent.

B. Enclosures
   1. Enclosures shall have a NEMA rating as indicated on the Drawings, and be constructed of No. 12 U.S.S. code gauge galvanized steel. The door shall be fastened to the enclosure with concealed hinges and shall be equipped with

flush-type catches and locks. The Contractor shall equip cabinet doors exceeding 40 inches in height with vertical bolt three point locking mechanism. All locks shall be keyed alike. The panelboard trim shall have a removable hinge assembly, in addition to the door hinge, that allows work inside the enclosure without the need to remove the trim. The enclosure shall have wiring gutters on sides and shall be at least 5-3/4 inches deep. The panelboard shall be provided with an information label. The information label shall include the panelboard designation, voltage, phase, wires, and bus rating.

2. All metal surfaces of the panelboard enclosures shall be thoroughly cleaned and given one prime of zinc chromate primer. All interior surfaces shall then be given one shop finishing coat of a lacquer of the nitro cellulose enamel variety. All exterior surfaces shall be given three coats of the same lacquer. The color of finishing coats shall be light gray ANSI #61.
3. An Underwriter's Laboratories, Inc. inspection label shall appear on the interior of the cabinet.

C. Bus Work
1. Main bus bars shall be of ample size so that a current density of not more than 1000 amperes per square inch of cross section will be attained. This current density shall be based on the application of the full load connected to the panel plus approximately 25% of the full load for spare capacity. The main bus shall be full capacity as based on the preceding for the entire length of the panel so as to provide full flexibility of circuit arrangement.
2. Solid neutral bus bars are required and neutral bus ampacity shall be the same as the main bus bars unless otherwise noted. Ratings shall be in accordance with applicable standards.
3. A separate ground bus shall be provided with lugs for termination of equipment grounding conductors.
4. Branch bus work shall be rated to match the maximum branch circuit breaker which may be installed in the standard space.
5. All bus shall be tin plated copper and shall extend the entire useable length of the panelboard, including spaces.

D. Circuit Breakers
1. Circuit breakers shall be bolt-on, molded-case type conforming to NEMA Standard AB 1. All circuit breakers shall have quick-make, quick-break, toggle mechanism for manual as well as automatic operation. Tandem or half-size circuit breakers are not acceptable
2. Where indicated on the Drawings, or where required by Code, circuit breakers shall be equipped with integrally mounted ground fault interrupters complete with "TEST" push button and shall be of a type which fit standard panelboard spaces for the breaker continuous current rating required. Circuit breakers used for lighting circuit switching shall be approved for the purpose and shall be marked "SWD". Where required by Article 440 of the NEC, circuit breakers installed for air conditioning units shall be HACR type.
3. Circuit breaker voltage ratings shall meet or exceed the panelboard voltage indicated on the Drawings. Trip elements of circuit breakers shall be 20A unless otherwise indicated on the Drawings. Circuit breakers shall have an interrupting rating at 240 VAC that matches the panelboard short circuit rating.
4. Where indicated on the Drawings, branch circuit breakers shall be provided with a padlockable hasp or handle padlock attachment for padlocking in the off position as required to meet the NEC requirement for disconnecting means and/or OSHA lock-out/tagout standard. Locking hardware shall remain in place

even when the packlock is removed. Branch circuit breakers used for control, instrumentation, telephone, fire alarm, or auxiliary equipment circuits requiring continuous operation shall be provided with a similar lock on device where indicated on the Drawings.

E. Directories
   1. Approved directories with noncombustible plastic cover, and with typewritten designations of each branch circuit, shall be furnished and installed in each panelboard. The Contractor shall maintain in each panel, during the duration of the Contract, a handwritten directory clearly indicating the circuit breakers in service. This directory shall be updated as work progresses, and final, typewritten directories, as specified above, shall be installed at the end of the project. Designations and circuit locations shall conform to the panelboard schedules on the Drawings, except as otherwise authorized by the Engineer.

2.04 POWER DISTRIBUTION PANELBOARDS

A. General
   1. Power distribution panelboards shall be of the configuration and rating as specified herein and as indicated on the Drawings. The panelboards shall be dead front type with automatic trip-free, non-adjustable, thermal overload branch circuit breakers. Panelboards shall be service entrance rated where indicated on the Drawings.
   2. Power panelboards shall be equipped with a main breaker or main lugs complete with branch circuit breakers as indicated on the Drawings. The panelboards shall be suitable for flush or surface mounting.
   3. Power distribution panelboards shall be fully rated and shall have a minimum short circuit rating of 65,000 amperes symmetrical unless otherwise indicated on the Drawings.
   4. Power distribution panelboards shall be Eaton Pow-R-Line Series, the Square D Company equivalent, the General Electric Company equivalent, or Siemens Energy and Automation, Inc. equivalent.

B. Enclosures
   1. Enclosures shall have a NEMA rating as indicated on the Drawings, and be constructed of No. 12 U.S.S. code gauge galvanized steel. The door shall be fastened to the enclosure with concealed hinges and shall be equipped with flush type catches and locks. The Contractor shall equip cabinet doors exceeding 40 inches in height with vertical bolt three point locking mechanism. All locks shall be keyed alike. The panelboard trim shall have a removable hinge assembly, in addition to the door hinge, that allows work inside the enclosure without the need to remove the trim. The enclosure shall have wiring gutters on sides and shall be at least 5 3/4 inches deep. The panel shall be provided with an information label. The information label shall include the panelboard designation, voltage, phase, wires, and bus rating.
   2. All metal surfaces of the panelboard enclosures shall be thoroughly cleaned and given one prime of zinc chromate primer. All interior surfaces shall then be given one shop finishing coat of a lacquer of the nitro cellulose enamel variety. All exterior surfaces shall be given three coats of the same lacquer. The color of finishing coats shall be light gray ANSI #61.
   3. An Underwriter's Laboratories, Inc. inspection label shall appear on the interior of the cabinet.

C. Bus Work

1. Main bus bars shall be of ample size so that a current density of not more than 1,000 amperes per square inch of cross section will be attained. This current density shall be based on the application of the full load connected to the panel plus approximately 25% of the full load for spare capacity. The main bus shall be full capacity as based on the preceding for the entire length of the panel so as to provide full flexibility of circuit arrangement.
2. Solid neutral bus bars, where required, shall be provided. Neutral bus shall have the same ampacity as the main bus, unless otherwise indicated. Ratings shall be in accordance with applicable standards.
3. A separate ground bus shall be provided with lugs for termination of equipment grounding conductors.
4. Branch bus work shall be rated to match the maximum branch circuit breaker which may be installed in the standard space.
5. All bus shall be tin plated copper and shall extend the entire useable length of the panelboard, including spaces. Panelboards Listed and Labeled as a four-wire panel shall not be used in place of a three-wire panel where a neutral conductor does not exist in the supply conductors to that panel.

D. Circuit Breakers
1. Circuit breakers shall be bolt-on, molded-case type conforming to NEMA Standard AB 1. All circuit breakers shall have quick-make, quick-break, toggle mechanism for manual as well as automatic operation.
2. Circuit breakers used for lighting circuit switching shall be approved for the purpose and shall be marked “SWD” where required by Article 440 by the NEC. Circuit breakers installed for air conditioning units shall be HACR type.
3. Circuit breaker voltage rating shall meet or exceed the panelboard voltage indicated on the Drawings. Trip elements of circuit breakers shall be 20A, unless otherwise indicated on the Drawings. Circuit breakers shall have an interrupting rating at 480 VAC that matches the panelboard short circuit rating.
4. Where indicated on the Drawings, branch circuit breakers shall be provided with a padlockable hasp or handle padlock attachment for padlocking in the off position as required to meet the NEC requirement for disconnecting means and/or OSHA lock-out/tagout standard. Locking hardware shall remain in place even when the padlock is removed. Branch circuit breakers used for control, instrumentation, telephone, fire alarm, or auxiliary equipment circuits requiring continuous operation shall be provided with a similar lock on device where indicated on the Drawings.

E. Directories
1. Approved directories with noncombustible plastic cover, and with typewritten designations of each branch circuit, shall be provided in each panel. The Contractor shall maintain in each panel, during the duration of the Contract, a handwritten directory clearly indicating the circuit breakers in service. This directory shall be updated as work progresses, and final, typewritten directories, as specified above, shall be installed at the end of the project. Designations and circuit locations shall conform to the panelboard schedules on the Drawings, except as otherwise authorized by the Engineer.

2.05 COMBINATION POWER UNITS

A. Combination power units shall be installed as specified herein and indicated on the Drawings. The unit shall be a combination of a dry type transformer and a lighting panelboard. Transformer rating and panelboard bus rating shall be as indicated on the Drawings. The transformer and panelboard shall meet the requirements for

these products as specified herein and elsewhere in these Specifications. Combination power units located outdoors shall be suitable for outdoor use and be provided in a NEMA 3R enclosure unless otherwise indicated.

B. Combination power units shall have all copper windings and terminations, and an 80°C temperature rise.

C. The combination power unit shall be a Mini-Power Zone as manufactured by the Schneider Electric, a Mini-Power Center as manufactured by Eaton, Service center as manufactured by General Electric Company, or Siemens Energy and Automation, Inc. equivalent.

2.06 SURGE PROTECTIVE DEVICES

A. Surge protective devices shall be provided in a separate enclosure external to the panelboard enclosure. See Section 16280 – Surge Protective Devices for panelboard SPD requirements.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install panelboards in accordance with NEMA PB 1.1.

B. Install panelboards plumb. Provide supports in accordance with Section 16070.

C. Height: 6 ft to top of panelboard unless conditions dictate otherwise.

D. Provide filler plates for unused spaces in panelboards.

E. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.

F. In continuously wet locations, space panelboards 1-inch off mounting surface.

G. Provide engraved plastic nameplates under the provisions of Section 16075.

3.02 FIELD QUALITY CONTROL

A. Field-testing will be performed under provisions of Division 1.

B. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.

C. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers.

END OF SECTION

SECTION 26 27 26.03

WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Light switches.

B. Receptacles.

C. Device covers.

1.02 RELATED SECTIONS

A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
   1. Boxes

1.03 REFERENCES

A. NEMA WD 1 - General Purpose Wiring Devices.

B. NEMA WD 6 - Wiring Device Configurations.

C. UL 20 – General Use Snap Switches

D. UL 498 – Standard for Attachment Plugs and Receptacles

E. UL 943 – Ground Fault Circuit Interrupters

F. UL 1203 – Standard for Explosion-proof and Dust-ignition-proof Electrical Equipment for use in Hazardous (Classified) Locations

1.04 SUBMITTALS

A. Submit under provisions of Division 1.

B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

C. Manufacturer's Instructions:
   1. Indicate application conditions and limitations of use stipulated by product testing agency specified under regulatory requirements.
   2. Include instructions for storage, handling, protection, examination, preparation, operation and installation of product.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years experience.

1.06 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown or other North Carolina Recognized Third Party Testing Agency.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The equipment covered by these Specifications is intended to be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.

B. The Contractor shall use the products of a single manufacturer for each type of wiring device.

C. The Contractor shall use the products of a single manufacturer for all device plates. Plate variations are allowed for the following devices:
   1. Where the selected plate manufacturer does not manufacture a suitable finish plate.
   2. For heavy duty receptacles rated at more than 30A.
   3. Where nonstandard plates are required, specified, or shown.

D. The Contractor shall furnish and install all wiring devices and device plates.

E. In non-hazardous areas, provide specification grade devices manufactured by Appleton, Crouse-Hinds, Leviton, Hubbell, Pass & Seymour, or Engineer approved equal.

F. In hazardous areas, provide devices manufactured by Appleton, Cooper Crouse-Hinds, Hubbell-Killark, or Engineer approved equal.

2.02 WIRING DEVICES

A. Wall switches for non-hazardous areas shall be rated for the current required to suit the application, but not less than 20A. Double pole, three-way, and four-way switches shall be provided where indicated on the Drawings, and as required. Switches shall be rated for 120-277VAC, and shall be UL 20 Listed.

B. Convenience receptacles for non-hazardous areas shall be rated for 20A at 125VAC. Convenience receptacles shall be UL 498 Listed. Tamper resistant receptacles are not acceptable.

C. Special purpose receptacles (welders, lab equipment, etc.) shall be provided with the proper NEMA configuration and ampacity as indicated on the Drawings. The coordinating plug for each special purpose receptacle shall be provided with the equipment which it is serving.

D. Ground fault circuit interrupter receptacles shall be rated for 20A at 125VAC. Ground fault circuit interrupter receptacles shall be UL 943 Listed. Tamper resistant receptacles are not acceptable.

E. Wall switches for hazardous areas shall be the factory sealed type, UL 1203 Listed for use in the hazardous area. Wall switches shall be rated for 120-277VAC, and shall be rated for the current required to suit the application, but not less than 20A

F. Receptacles for hazardous areas shall be rated 20A at 120-240VAC. Receptacles shall be UL 1203 listed for use in the hazardous area, utilizing delayed-action construction.

G. All wiring devices shall be approved for use with stranded conductors, if stranded conductors are to be used with the device. Reference Section 16123, Low Voltage Wire and Cable for conductor requirements

2.03 DEVICE PLATES

A. Device plates for indoor flush mounted receptacles and switches shall be made of Type 304 stainless steel, not less than 0.032 of an inch thick, with beveled edges and milled on the rear so as to lie flat against the wall. Devices plates shall be provided with a gasket.

B. Device plates for outdoor installations, indoor wet process areas, and chemical storage/transfer areas shall be Appleton Type FSK, Crouse Hinds #DS185, or equal for wall switches. Device plates for receptacles shall be “in-use” style. “In-use” weatherproof covers shall be rugged, minimum 3 ¼” depth, die-cast aluminum as manufactured by Thomas & Betts "Red Dot," Intermatic International, Inc., or equal.

C. Device plates for indoor dry process and non-process areas with surface mounted boxes shall be Crouse-Hinds DS32, or equal for switches, and Crouse-Hinds DS23 or equal for receptacles.

2.04 PLUGS

A. The Contractor shall furnish suitable plugs with equipment furnished under the respective specification Section. Plugs shall be black rubber or plastic. For waterproof receptacles, the plugs shall be similar in construction to the receptacles and shall be encased in corrosion resistant yellow housing provided with clamping nuts and stuffing gland cable outlets.

2.05 PROCESS INSTRUMENTS

A. The Contractor shall furnish and install a local disconnect switch at each process instrument (e.g., level transmitter, flow transmitter, analytical instrument etc.,) to disconnect the 120VAC power supply to the instrument. The device shall be a NSSC series manual motor starting switch without overload protection as manufactured by Crouse-Hinds, Appleton equivalent, or equal. For hazardous locations, the device shall be UL 1203 Listed.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean debris from outlet boxes.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install devices plumb and level.

C. Install switches with OFF position down.

D. Connect wiring device grounding terminal to outlet box with bonding jumper and to branch circuit equipment grounding conductor.

E. All receptacles shall have a self-adhesive label installed on the top at the respective device plate that indicates which panel and which circuit number the receptacle is supplied from.

3.03 FIELD QUALITY CONTROL

A. Inspect each wiring device for defects.

B. Operate each wall switch with circuit energized and verify proper operation.

C. Verify that each receptacle device is energized.

D. Test each receptacle device for proper polarity.

E. Test each GFCI receptacle device for proper operation.

3.04 ADJUSTING

A. Adjust devices to be installed plumb.

END OF SECTION

SECTION 26 28 16.19

ENCLOSED SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Disconnect Switches

1.02 RELATED SECTIONS

A. Section 16070 – Supporting Devices

B. Section 16075 – Electrical Identification

1.03 REFERENCES

A. NECA - Standard of Installation.

B. NEMA FU1 – Low Voltage Cartridge Fuses.

C. NEMA KS 1 - Enclosed Switches and Miscellaneous Distribution Equipment Switches (600 volts maximum).

D. NFPA 70 - National Electrical Code.

E. UL 198E - Class R Fuses.

F. UL 991

G. NFPA 70 – National Electrical Code

1.04 SUBMITTALS

A. Submit under provisions of Division 1.
   1. Product Data: Provide switch ratings and enclosure dimensions.
   2. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.05 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division 1.

B. Maintenance Data: Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with NECA Standard of Installation.

B. Maintain one copy of each document on site.

1.07 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

B. Furnish products listed and classified by UL as suitable for purpose specified and shown or other North Carolina Recognized Third Party Testing Agency.

1.08 EXTRA MATERIALS

A. Furnish under provisions of Division 1.

B. Provide three of each size and type fuse installed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The equipment covered by this Specification is intended to be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.

B. Switches shall be manufactured by the Square D Company, Eaton, the General Electric Company, or Siemens Energy and Automation, Inc.

2.02 DISCONNECT SWITCHES

A. Disconnect switches shall be heavy duty type and/or as specified in these Specifications. Switches shall be furnished and installed as shown on the Drawings and as required by the NEC. Handles shall be lockable.

B. Disconnect switches for non-hazardous areas shall be UL 98 Listed. Disconnect switches for hazardous areas shall be UL 1203 Listed.

C. Switches shall meet NEMA Standard KS 1 type HD requirements, be, single throw, be externally operated, and be fused or non fused as indicated on the Drawings. Switches shall have the number of the poles, voltage, and ampere ratings as shown on the Drawings.

D. In non-hazardous locations, disconnect switches shall be furnished with the following enclosure type and material of construction, dependent upon the designation of the area in which they are to be installed. Area designations are indicated on the Drawings.
   1. Indoor Wet Process Area – NEMA 4X, Type 304 Stainless Steel
   2. Indoor Dry Process Area – NEMA 12, Painted Steel
   3. Indoor Dry Non-process Area – NEMA 1, Painted Steel
   4. Indoor Chemical Storage/Transfer Area – NEMA 4X, Type 304 Stainless Steel
   5. All Outdoor Areas – NEMA 4X, Type 304 Stainless Steel

E. Disconnect switches shall be quick make, quick break and with an interlocked cover which cannot be opened when switch is in the "ON" position and capable of being locked in the "OPEN" position.

F. A complete set of fuses for all switches shall be furnished and installed as required. Time current characteristic curves of fuses serving motors or connected in series with circuit breakers shall be coordinated for proper operation. Fuses shall have voltage rating not less than the circuit voltage.

G. Disconnect switches shall be furnished with a factory installed internal barrier kit that helps prevent accidental contact with live parts and provides “finger-safe” protection when the door of the enclosed switch is open.

H. Disconnect switches shall be furnished with a manufacturer-supplied ground lug kit for termination of equipment grounding conductors. Where a grounded (neutral)

conductor is shown on the Drawings in the conduits connected to the disconnect switch, a manufacturer-supplied neutral bar shall be furnished for termination of the grounded conductors. Third party ground lug and neutral lug kits not supplied by the disconnect switch manufacturer are not acceptable.

I. Disconnect switches for all motors connected to variable frequency drives (VFDs) shall be furnished with a factory installed electrical interlock kit that includes one (1) early-break auxiliary contact rated for 5A (minimum) at 120 VAC to be used to open the control circuit before the main switch blades break.

PART 3 EXECUTION

3.01 FACTORY TESTING

A. The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of UL and NEMA standards.

B. Insulation check to ensure the integrity of insulation and continuity of the entire system

C. Visual inspection to ensure that the switch matches the specification requirements and to verify that the fit and finish meet quality standards

D. Mechanical tests to verify that the switch's power sections are free of mechanical hindrances

E. Electrical tests to verify the complete electrical operation of the switch.

3.02 INSTALLATION

A. Install in accordance with NECA "Standard of Installation", per the manufacturer's recommendations and the contract drawings.

B. Height: 5 ft. to center of operating handle unless otherwise shown or conditions dictate otherwise.

C. Install switches plumb. Attach to wall or equipment rack panel in accordance with Section 16070.

D. Install fuses in fusible disconnect switches. Install fuses with label oriented such that manufacturer, type, and size are readable.

E. Provide engraved plastic nameplates under the provisions of Section 16075.

F. All necessary hardware to secure the assembly in place shall be provided by the contractor.

G. The equipment shall be installed and checked in accordance with the manufacturer's recommendations.

END OF SECTION

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SECTION 26 43 00.03

SURGE PROTECTION DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surge protective devices.

1.02 DESCRIPTION

A. This section covers surge protection devices (SPDs). The work shall include all materials, labor, and auxiliaries required to provide complete surge suppression for the protection of electrical and electronic systems from the effects of line and electromagnetic induced transient voltage surges and coupled lightning discharged transients as indicated on drawings or as specified in this section.

B. SPDs shall limit transient voltage by diverting or limiting surge current. They shall prevent continued flow of follow current while remaining capable of repeating their transient voltage limiting functions.

1.03 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.04 CODES AND REFERENCES

A. Qualification Data: Third Party testing lab or U.S. Department of Labor/OSHA approved NRTL.
   1. Agency Approval/Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the testing indicated, that is a Nationally Recognized Testing Laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7.
   2. All SPDs shall be tested and listed to UL 1449 3rd Edition and Complimentary Listed to UL 1283 by a NRTL.

B. Applicable Documents – Most Recent Editions of:
   1. ANSI/IEEE Std C62.41.1, IEEE Guide on the Surge Environment in Low-Voltage (1000 V and Less) AC Power Circuits.
   2. ANSI/IEEE Std C62.41.2, IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits.
   3. ANSI/IEEE Std C62.45, IEEE Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000 V and Less) AC Power Circuits.
   4. ANSI C84.1, American National Standard for Electric Power Systems and Equipment – Voltage Ratings (60 Hertz).
   5. IEEE Standard 1100, IEEE Recommended Practice for Power and Grounding Electronic Equipment - Clause 8.6.1.
   6. National Fire Protection Association (NFPA) 70 (N.E.C.) – Article 285.
   7. ANSI/UL 1283, Electromagnetic Interference Filters.
   8. ANSI/UL 1449, Surge Protective Devices.
   9. IEEE Std C62.72 – IEEE Guide for the Application of Surge-Protective Devices for Low-Voltage (1000 V or less) AC Power Circuits.

1.05 DEFINITIONS

A. Modes Of Protection:
   1. System shall provide discrete protection for all modes with directly connected protection elements including line to line, line to neutral, line to ground, and neutral to ground. Distinct and independent protection circuitry for each mode is required.

B. Per Phase Ratings:
   1. 'Per-Phase' ratings for a three-phase Wye-connected SPD are determined by multiplying the kA per mode times the number of discrete modes of protection (directly connected suppression components), minus the value for the Neutral to Ground mode, divided by the number of phases.
      a. Per-Phase = (((kA per mode) X (# of modes))-(N-G mode kA)) / (# of phases)).

1.06 SUBMITTALS

A. Product Data: For each type of product indicated, include the following testing and manufacturer information:
   1. Short Circuit Current Rating (SCCR).
   2. Voltage Protection Ratings (VPRs) for all modes.
   3. Maximum Continuous Operating Voltage rating (MCOV).
   4. I-nominal rating (I-n).
   5. Operating weights.
   6. Electrical characteristics.
   7. Accessories.
   8. NEMA Enclosure Type.

B. IEEE Std. C62.41.2TM-2002 test reports. Include complete let-through voltage/measured limiting voltage test data (not SVR or VPR), test graphs and scope traces for each and every mode for each product submitted for Category's C, B, A (including Cat A, 2 kV, 67 A, 100 kHz ring wave at both 90 & 270 degree electrical phase angles). Testing shall be conducted as follows:
   1. Test Parameters: Positive Polarity, Net voltages are peak (±10%). All tests are static (unpowered) except 150 V MCOV modes. Let-through voltages on static tests calculated by subtracting sinewave peak from let-through measured from zero. 150 V MCOV mode let-through voltages measured from the insertion point on the sinewave. Each phase is the average of the 3 modes. In order to duplicate the results, the specified mode must be tested for all three phases (except N-G) and averaged together. (Individual mode or shot results may not vary by more than 10%. Scope Settings: Time Base = 10 microseconds, Sampling Rate = 250 Megasamples/sec. These settings assure Let-through voltages test results are accurate). All tests performed with 6" lead length (external to the enclosure), simulating actual installed performance per the ANSI/UL 1449-2006 standard.
   2. Let-through voltages furnished within this testing must not exceed the following to be considered for approval, no exceptions:
      a. Service Entrance 120/208 V 3Ph Wye (IEEE Cat C High Current Driven Surge Test Results (10 kA)) (L-N 730 V) (L-L 965 V) (L-G 785 V) (N-G 995 V)
      b. Service Entrance 120/208 V 3Ph Wye (IEEE Cat C High Current Driven Surge Test Results (10 kA)) (L-N 730 V) (L-L 965 V) (L-G 785 V) (N-G 995 V)

c. Distribution 120/208 V 3Ph Wye (ANSI/UL 1449-2006 VPRs): (L-N 600 V) (L-G 600 V) (L-L 1000 V) (N-G 600 V)
d. Distribution 277/480 V 3Ph Wye (ANSI/UL 1449-2006 VPRs): (L-N 1200 V) (L-G 1200 V) (L-L 1800 V) (N-G 1200 V)
e. Branch 120 V (IEEE Cat A Ringwave (2 kV)) Test Results (@ 270º phase angle)): (L-N 30 V) (L-L 40 V) (L-G 50 V) (N-G 50 V)
f. Branch 277 V (IEEE Cat A Ringwave (2 kV)) Test Results (@ 270º phase angle)): (L-N 60 V) (L-L 105 V) (L-G 80 V) (N-G 60 V)

C. Certificates of Conformity: For SPDs, certifying compliance with and NRTL listing/certification to, the following standards:
1. UL 1449 3rd Edition.
2. UL 1283 (complimentary listed).

D. Operation and Maintenance Data.

E. Warranty duration and replacement policy.

F. Manufacturer's installation instructions to include wiring diagram to show field connections and manufacturer's recommended wire and breaker sizes.

1.07 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a NRTL testing agency, and marked for intended location and application.

B. Manufacturer's Qualifications: At least 10 years engineering experience in the engineering, design, and manufacture of permanently connected SPDs.

C. Manufacturer operates a Quality System Certified manufacturing facility as ISO 9001:2000 Compliant.

1.08 WARRANTY

A. The manufacturer shall provide unlimited free replacement of the entire SPD or defective modules for a period of 20 years from date of Substantial Completion

PART 2 PRODUCTS

2.01 SERVICE ENTRANCE

A. Manufacturers:
1. Surge Suppression, Inc. model no. CSEB3Y2.
2. Equal by Liebert
3. Equal by Advanced Protection Technologies.
4. Equal by Current Technologies.

B. Description:
1. UL 1449, 3rd Edition Listed.
2. Dedicated, discrete Ten Mode Protection: L-N, L-G, L-L and N-G.
3. Permanently mounted, parallel connected.
4. Sine wave tracking.
5. Self-restoring and fully automatic.

C. Ratings:
1. Voltage: 480Y/277 volts, 3 phase, 4 wire, 60 Hz.

2. Peak Single-impulse Surge Current Rating: 200 kA per phase minimum.
3. Nominal Discharge Current: 20 kA per mode.
4. Maximum Continuous Operating Voltage (MCOV): 115% of nominal RMS voltage.
5. Short Circuit Current Rating (SCCR): 200 kAIC.
6. Voltage Protection Ratings (VPRs) as follows:

Nom. System Voltage	Mode		VPR
120/240V, 1 Ph., 3W	L-N	150V	700V
	L-L	300V	1000V
	L-G	150V	700V
	N-G	150V	700V
208Y/120V, 3 Ph., 4W	L-N	150V	700V
	L-L	300V	1000V
	L-G	150V	700V
	N-G	150V	700V
240/120V, 3 Ph., 4W, High Leg Delta	L-N	150V	700V
	HL-N	320V	1500V
	L-L	300V	1800V
	L-G	150V	700V
	HL-G	320V	1800V
	N-G	150V	700V
480Y/277V, 3 Ph., 4W	L-N	320V	1200V
	L-L	550V	1800V
	L-G	320V	1200V
	N-G	320V	1200V

D. Options:
1. LED indicator lights for power and protection status.
2. Audible alarm to actuate when any part of the surge circuitry has been damaged. Provide silence button.
3. Integral disconnect switch with exterior handle.
4. Weathertight, corrosion resistant NEMA 4X, Type 304 stainless steel enclosure.

2.02 FUSING

A. Provide as a minimum, over-current, over temperature protection in the form of component-level thermal fusing to ensure safe failure and mitigate thermal runaway.

B. Provide integral short circuit current fusing within each device. This fusing will be independent of the “component-level” fusing and specifically for over-current protection and shall be constructed utilizing surge rated, cartridge fuses.

C. The fusing mechanisms employed must effectively coordinate their performance in conjunction with the high current abnormal over-voltage testing under UL 1449 3rd Edition.

PART 3 EXECUTION

3.01 INSTALLATION

A. SPDs shall be installed at locations indicated.

B. Shall be installed in accordance with manufacturer's instructions and NFPA 70.

C. Shall not be installed at a point on the system where the available fault current exceeds that of the SPD rating.

D. Service Entrance:
   1. Suppressor shall be installed on the load side of the service disconnect overcurrent device.
   2. Conductors between the suppressor and point of attachment shall be #6 stranded copper or as recommended by the manufacturer.
   3. Conductors shall be kept as short and straight as possible; do not exceed manufacturer's recommended lead length.
   4. Phase conductors shall be twisted one turn per 12 inches of conductor length to reduce inductive effects.
   5. Do not energize or connect service entrance equipment and panelboards to their sources until SPDs are properly installed and connected.
   6. Do not perform insulation resistance tests of the distribution wiring equipment with the SPD installed. Disconnect all SPDs before conducting insulation resistance tests, and reconnect immediately after the testing is over.

END OF SECTION

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SECTION 26 51 00.03

LUMINAIRES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Luminaires.

B. LED Fixtures.

1.02 RELATED SECTIONS

A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
   1. Boxes

1.03 REFERENCES

A. Underwriter's Laboratories, Inc. (UL):
   1. UL 924 – Emergency Lighting and Power Equipment
   2. L 844 – Luminaires for Use in Hazardous (Classified) Locations
   3. UL 1598 – Luminaires

B. American National Standards Institute (ANSI):
   1. ANSI C62.41 – Guide for Surge Voltages in Low-Voltage AC Power Circuits

C. National Electrical Code (NEC), latest edition.

D. Town of Apex Unified Development Ordinance

1.04 SUBMITTALS

A. Submit under provisions of Division 1.
   1. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
   2. Product Data: Provide dimensions, ratings, and performance data.
   3. Pole calculations.

1.05 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division 1.

B. Accurately record actual locations of each luminaire.

1.06 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division 1.

B. Product Data: Provide lamp requirements, listing of available accessories, and photometric data.

C. Maintenance Data: Include available accessories data listing, source and current prices of accessories, and recommended cleaning and maintenance procedures.

1.07 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Conform to requirements of NFPA 101.

C. Furnish products listed and classified by Underwriters Laboratories, Inc. or other North Carolina recognized third party testing agency.

PART 2 PRODUCTS

2.01 LUMINAIRES

A. Each fixture shall bear the Underwriters Laboratories, Inc. label. All ighting fixture shall be furnished complete with lamps of the size and type as indicated on the Drawings an all fittings and hardware necessary for a complete installation. Lighting fixtures shall have all the parts and fittings necessary to completely and properly install the fixtures.

B. Fixture leads shall be required by NEC and shall be grounded by the equipment grounding conductor in the conduit.

C. All glassware shall be high quality, homogeneous in texture, uniform in quality, free from defects, of uniform thickness throughout, and properly annealed. Edges shall be rounded and free from chips or rough edges.

D. Fixtures specified to be damp or wet locations rated shall be UL 1598 listed.

E. Substitutions: Under provisions of Division 1.

F. Fixtures shall be as specified in the fixture schedule on the Drawings.

2.02 LED DRIVERS

A. Drivers shall have a voltage range of (120-277) +/- 10% at a frequency 60 Hz.

B. All drivers shall be designed to a power factor >90% with a total harmonic distortion THD <20% at full load.

C. Case temperature shall be rated for -40°C through +80°C.

D. Drivers shall have overheat protection, self-limited short circuit protection and overload protection.

E. Drivers shall be furnished with a fused primary.

F. Drivers shall have an output current ripple <30%

G. Drivers shall have a five year (50,000 hour) warranty.

H. Drivers shall be manufactured by Advance, Universal, or equal.

I. Drivers shall be UL Listed for damp location, UL 1012, UL 935, & ROHS.

J. Drivers shall meet FCC 47 Sub Part 15.

K. All Drivers shall be provided with ANSI/IEEE C62.41 Category C (10kV/5kA) surge protection.

2.03 LEDS

A. Luminaires provided with LED technology shall utilize high brightness LEDs with a group binning code of P and/or Q.

B. Junction point shall be designed and manufactured to allow adequate heat dissipation.

C. LEDs shall be rated for 50,000 hours of life, minimum.

2.04 POLES

A. Poles shall be designed to withstand calculated wind force based on wind velocity in accordance with the provisions of the North Carolina Building Code.

B. Pole mounted fixtures shall be mounted on poles as designated in the fixture schedule or as indicated on the Drawings. Poles shall have adequate handholes and weatherproof receptacles where indicated. All anchor bolts and nuts shall be stainless steel.

2.05 LIGHTING CONTROLS

A. Lighting contactors shall be as manufactured by Eaton, the Square D Company, General Electric Company, or Siemens Energy and Automation, Inc. Lighting contactors shall be heavy duty industrial type with 30A minimum rating and shall have the number of contacts required. Contactor ampere rating shall be increased as required to suit the application. Contactor coil voltage shall be as indicated on the Drawings. Contactors shall be the electrically or mechanically held type as indicated on the Drawings. Contactors shall include fused integral control power transformers. Any auxiliary relays, or other devices required for proper operation shall be included.

B. In non-hazardous locations, lighting contactors shall be furnished with the following enclosure type and material of construction, dependent upon the designation of the area in which they are to be installed. Area designations are indicated on the Drawings.
   1. Indoor Wet Process Area – NEMA 4X, Type 304 Stainless Steel
   2. Indoor Dry Process Area – NEMA 12, Painted Steel
   3. Indoor Dry Non-process Area – NEMA 1, Painted Steel
   4. Indoor Chemical Storage/Transfer Area – NEMA 4X, Type 304 Stainless Steel
   5. All Outdoor Areas – NEMA 4X, Type 304 Stainless Steel

C. Photocells shown on the Drawings that are not integral to a fixture provided by the (lighting manufacturer) shall be provided by the Contractor. Photocells shall be rated for 120 VAC, 1800W, and be provided with 1/2” or 3/4” threads for box mounting. Photocells shall be Model K4121C by Intermatic, or equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Lighting fixtures shall be located symmetrically with building lines as shown on the Drawings. The Contractor shall furnish and install the lighting fixtures to allow "convenient" access for maintenance such as cleaning, and other activities. The fixtures shall be installed to be accessed by a 12 ft. (max.) ladder. Where fixtures are shown in locations on the Drawings where maintenance would be difficult, the Contractor shall notify the Engineer for direction.

B. The Contractor shall provide and install all inserts, conduit, structural supports as required, poles, wiring, and any other items required for a complete system.

Contractor shall properly adjust and test, to the satisfaction of the Engineer, the entire lighting system. The Contractor shall provide pigtails and flexible conduit connected to an outlet box where necessary or required resulting in a neat and complete installation.

C. The Contractor shall protect all fixtures at all times from damage, dirt, dust, and the like. Before final acceptance, all fixtures and devices shall be cleaned of all dust, dirt or other material, be fully re-lamped (except LED fixtures) and in operating condition to the satisfaction of the Engineer.

D. The Contractor shall furnish and install all pendant trapezes and pendant stem hangers with durable swivel or equivalent trapeze hanger permitting normal fixture motion and self alignment. Fixture pendants shall be Appleton Type UNJ ball type flexible hanger at the fixture and supports from an Appleton JBLX junction box with JBLX hub cover, or equal. Pendant lengths shall be adequate and adjusted to provide uniformity of installation heights above the reference datum. Stems shall be one piece, with matching canopies and fittings.

E. Fixtures located on the exterior of the building shall be provided with neoprene gasket and non ferrous metal screws finished to match the fixtures.

F. The finish or exposed metal parts of lighting fixtures and finish trims of all recessed lighting fixtures shall be as directed by the Engineer.

G. The Contractor shall furnish and install recessed fixtures with a separate junction box concealed and located as to be accessible when fixture is removed.

H. The Contractor shall furnish and install all boxes for lighting fixtures such that the box is not the sole support of the fixture. The boxes shall be offset to allow maintenance such that access to wiring within the box can be attained without having to consider supporting (holding) the fixture.

I. All lighting units, when installed, shall be set true and be free of light leaks, warps, dents, and other irregularities. All hangers, cables, supports, channels, and brackets of all kinds for safely erecting this equipment in place, shall be furnished and erected in place by the Contractor.

J. The Contractor shall install fixtures at mounting heights indicated on the Drawings or as instructed by the Engineer. In areas with exposed ducts and/or piping, installation of lighting fixtures shall be adapted to field conditions as determined by the Engineer.

K. The Contractor shall support each fixture securely. Each fluorescent fixture shall be secured to the building structure. The Contractor shall not secure fixtures to the work of other trades, unless specified or noted otherwise, and shall not support fixtures from plaster. The Contractor shall furnish and install all steel members and supports as required to fasten and suspend fixtures from the structure.

L. In all mechanical equipment areas, the Contractor shall install lighting fixtures on the ceiling after all piping and equipment therein has been installed. Exact locations for such fixtures may be determined by the Engineer on the site during the course of the work.

M. Upon completion of work, and after the building area is broom clean, all fixtures shall be made clean and free of dust and all other foreign matter both on visible surfaces, and on surfaces that affect the lighting performance of the fixture including diffusers, lenses, louvers, and reflectors.

N. All fixtures that require physical adjustment shall be so adjusted in accordance with the directions of the Engineer. The Contractor shall also adjust angular direction of fixtures and/or lamps, as directed.

O. Access tp fixtures including LED fixtures shall require no special tools. All optical control surfaces such as lenses and reflectors shall be safely and securely attached to fixtures and shall be easily and quickly removed and replaced for cleaning without the use of special tools. No fixture part that may be removed, for maintenance, shall be held in place by metal tabs that must be bent to remove said part.

P. The Contractor shall furnish and install time switches and photocells as specified herein or indicated on the Drawings. Time switches shall be provided with a manual bypass switch controlling the lights locally and remotely. Time switches shall control contactors, relays, or direct controlling of one, two, or three lighting circuits, as indicated. The Contractor shall furnish and install photocells as specified herein or indicated on the Drawings for automatic "ON/OFF" switching of outdoor lighting.

Q. Lighting contactors shall be provided in the enclosure type and material of construction required for the area in which it is installed. Reference the requirements in Part 2 herein, and the area designations indicated on the Drawings.

R. The Contractor shall furnish and install a concrete foundation for the pole mounted fixtures as required. This applies to foundations for pole mounted fixtures located in the yard (i.e. site lighting) and foundations that are part of a structure (e.g. filters). Foundation shall be approved by a Professional Structural Engineer currently registered in the State of North Carolina. The wind design shall be in accordance with ASCE 7 and the North Carolina Building Code. Pole structure/foundation shall be able to handle fixture/pole weight and withstand wind velocity of up to 110 mph with a 1.3 gust factor. Provide calculations signed and sealed by a Professional Structural Engineer for review.

S. One (1), 3/4" diameter, 10’-0” long ground rod, furnished in accordance with Section 16060, Grounding & Bonding, shall be driven adjacent to each pole. The pole, anchor bolts, steel reinforcement bar in the base, and equipment grounding conductor shall all be bonded to the ground rod.

3.02 FIELD QUALITY CONTROL

A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.03 ADJUSTING

A. Adjust Work under provisions of Division 1.

B. Replace luminaires that have failed at Substantial Completion.

3.04 CLEANING

A. Clean electrical parts to remove conductive and deleterious materials.

B. Remove dirt and debris from enclosure.

C. Clean photometric control surfaces as recommended by manufacturer.

D. Clean finishes and touch up damage.

END OF SECTION

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SECTION 31 11 00

CLEARING AND GRUBBING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Work shall include, but not be limited, to the following:
   1. Clearing and grubbing.
   2. Removal of surface debris.
   3. Temporary and permanent ground cover.

1.02 RELATED SECTIONS

A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
   1. Section 31 25 00, Erosion Control and Sedimentation Control
   2. Section 33 92 00, Lawns and Grasses.

1.03 WARRANTY AND FINES

A. Contractor is liable for damages to public and private property and fines as may be placed on the Project by the governing agencies due to failure to provide adequate erosion control devices.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROTECTION

A. Take reasonable care during construction to avoid damage to vegetation outside of the construction limits. Temporarily tie back ornamental shrubbery and tree branches, where appropriate, to minimize damage. Trees that receive damage to branches shall be trimmed of those branches to improve the appearance of the tree. Treat tree trunks damaged by equipment with a tree dressing.

B. Locate and protect property corners and survey control stakes prior to start of clearing operations.

C. Provide temporary gates and fences as necessary to prevent unauthorized vehicular access to the site.

D. Mark clearing limits.

E. Refer to paragraph 5.05 of the General Conditions concerning the protection of Underground Facilities.

3.02 INSTALL EROSION CONTROL DEVICES

A. Clear areas required to install erosion control devices, which shall be in place and operational prior to other land disturbing activity. Install erosion control devices in accordance with Section, Erosion Control.

3.03 CLEARING AND GRUBBING

A. Clearing shall consist of cutting and removal of vegetation to the existing ground surface and removal of debris. Debris shall include, but not be limited to, fences, steps, walls, chimneys, footings, foundation slabs, basements, signs, junked vehicles, and other rubble.

B. Grubbing shall consist of the removal of roots over 3 inches in diameter, matted roots, stumps, and other vegetable matter to 12 inches below existing grade.

C. Do not precede grading operation by grubbing operation by more than seven days.

D. Fill holes and depressions and bring cleared and grubbed area to a uniform contour to match existing grade. Provide positive drainage.

E. Remove and properly dispose of cleared and grubbed material from the site. Make reasonable effort to channel timber resulting from clearing operations into a beneficial use.

F. Burning shall not be permitted at the site.

END OF SECTION

SECTION 31 20 00

EARTH MOVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Provide labor, equipment, and material to perform site preparation and earthwork as specified herein and indicated on the Drawings. Work shall include, but is not limited to, the following:
   1. Survey staking as required for construction.
   2. Topsoil stripping and stockpiling.
   3. Dewatering.
   4. Protection of existing facilities.
   5. Site grading.
   6. Excavation, trenching, and backfilling for structures and foundation including stone base as indicated on the Drawings.
   7. Borrow material including, but not limited to, material, excavating, hauling, placing, and compacting.
   8. Maintenance and stability of site.
   9. Disposal of waste and surplus material.
   10. Soil testing.

B. Examine the site to determine the extent of excavating, grading, and related items necessary to complete the work.

1.02 RELATED SECTIONS

A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
   1. Section 31 11 00 Clearing and Grubbing
   2. Section 31 23 33 Trenching for Utilities
   3. Section 31 25 00 Erosion and Sedimentation Control

1.03 MEASUREMENT AND PAYMENT PROCEDURES

A. Work in this section shall be included in the lump sum Base Bid or Alternate as appropriate, unless specifically noted otherwise, and shall include, but not be limited to, the following:
   1. Topsoil stripping, stockpiling and spreading after the completion of the grading.
   2. Backfilling of area stripped of topsoil and filling from existing grades to new subgrade elevation. Providing borrow material for backfilling and filling.
   3. Excavating for structures.
   4. Stone base as indicated on the Drawings.
   5. Dewatering.
   6. Use of explosives.
   7. Protection of existing service lines and utility structures.
   8. Maintenance and Stability of site grading.
   9. Disposal of waste and surplus material.
   10. Soil Testing.

1.04 REFERENCE STANDARDS

A. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2023.

B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2012 (Reapproved 2021).

C. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method; 2015, with Editorial Revision (2016).

D. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2015.

E. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2017, with Editorial Revision (2020).

F. ASTM D1586 - Penetration Test and Spilt-Barrel Sampling of Soils.

G. ASTM D2216 - Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures.

H. ASTM D2922 - Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

1.05 DEFINITIONS

A. Backfill: A specified material used in refilling a cut, trench, or other excavation, placed at a specified degree of compaction.

B. Capillary Water Barrier: A layer of clean, poorly graded crushed rock, stone, or natural sand or gravel having a high porosity, which is placed beneath a building slab with or without a vapor barrier to cut off the capillary flow of water to the area immediately below the slab.

C. Compaction: Process of mechanically stabilizing a material by increasing its density at a controlled moisture condition. "Degree of compaction" shall be expressed as a percentage of the maximum dry density obtained by the test procedure presented in ASTM D698 (Standard Proctor).

D. Excavation: The removal of soil or rock to obtain a specified depth or elevation.

E. Fill: Specified material placed at a specified degree of compaction to obtain an indicated grade or elevation.

F. Hard Material: Solid, homogeneous material which are not included in the definition of "rock" but which usually require the use of heavy excavation equipment with ripper teeth. Material having a standard penetration resistance as determined by ASTM D1586 60 and 150 blows per foot is defined as "hard material."

G. Lift: Layer of soil placed on top of a previously prepared or placed soil.

H. Rock: Solid, homogeneous material which cannot be removed without the systematic drilling and blasting exceeding one (1) cubic yard in volume. Material having a standard penetration resistance as determined by ASTM D1586 greater than 150 blows per foot is defined as "rock." Removal of "hard material" will not be considered rock excavation because of intermittent drilling and blasting that is performed merely to increase production.

I. Soil classification shall be in accordance with ASTM D2487.
   1. Satisfactory materials: Soils classified as GW, GP, GC, GM, SP, SC, SM, SW, ML, and CL.

2. Unsuitable materials: Soils considered as unsatisfactory shall be materials that do not comply with the requirements of satisfactory above and include, but shall not be limited to, the following:
    a. Soil containing organic matter, debris, stones larger than 6 inches, or frozen material. Stones greater than 4 inches will not be permitted in the top 12 inches.
    b. Soils classified as Pt, CH, MH, OH, and OL.
3. Cohesionless: Classified as GW, GP, SW, and SP. Soils classified as GM and SM shall be classified as cohesionless only when the fines have a plasticity index of less than 10.
4. Cohesive: Classified as GC, SC, ML, CL, MH, and CH. Soils classified as GM and SM shall be classified as cohesive only when the fines have a plasticity index greater than 10.

J. Subgrade: Lowest elevation upon which fill or other work will be placed in the absence of unsuitable material.

K. Topsoil: Natural, friable soil, representative of productive soils in the vicinity of the site. Topsoil shall be free from roots, stones larger than 1 inch, objectionable weed seeds, toxic substances, and materials that hinder grading, planting, and maintenance operations.

1.06 SUBMITTALS

A. Submit the following in accordance with Section, Submittal Procedures:
1. Catalog Data: Submit manufacturer's standard drawings or catalog cuts for the following.
    a. Structural fabric.
2. Manufacturer's Installation Procedures.
    a. Structural fabric
3. Test Reports: Submit for the following:
    a. Moisture-density relations of soils.
    b. Field moisture content.
    c. Soil classification.
    d. In-place field density.
    e. Geotechnical engineer's daily field reports.
4. Permits
    a. Erosion control permits for borrow and disposal site(s).

PART 2 PRODUCTS

2.01 MATERIAL

A. Capillary water barrier: A clean crushed stone, crushed gravel, or uncrushed gravel conforming to ASTM C33 coarse aggregate grading size 57, 67, or 7.

B. Stone Base: A clean crushed stone, crushed gravel, or uncrushed gravel conforming to ASTM C33 coarse aggregate grading size ABC

C. Structural Fabric: Provide structural fabric specifically designed and manufactured to stabilize soft soils under an aggregate base for roads and parking areas. Fabric shall provide a permeable layer, planar flow, and tensile reinforcement for retaining the soil matrix. Fabric shall be inert to commonly encountered chemicals, hydrocarbons, resistant to mildew, rot, and ultraviolet light exposure, and meet or exceed the following test standards:

	TEST	ASTM	
1.	Fabric weight (oz / sq yd)	D-1910	6
2.	Grab tensile strength (lbs.	D-1682	200
3.	Mullen burst strength (psi)	D-3786	320
4.	Puncture strength (lbs.)	D-751	80

PART 3 EXECUTION

3.01 GENERAL

A. Provide erosion control measures as specified in Section, Erosion Control and clearing and grubbing as specified in Section, Clearing and Grubbing.

B. Protect existing structures and features to remain.

C. Dispose of excavated material in such a manner that it will not obstruct the water flow, endanger existing improvements or Work in progress, impair the use or appearance of the existing facilities, or be detrimental to the completed Work.

D. Weather Limitations: Proceed with fill and backfill operations based on the following weather conditions:
   1. Temperature must be above freezing.
   2. In windy, hot, or arid conditions with a high rate of evaporation add moisture to the material to maintain the optimum moisture content.
   3. Do not proceed in rain or on saturated subgrade.

E. Repair or undercut and backfill soils that become damaged by construction activity or unsuitable due to being left exposed to the weather at no additional cost.

F. Do not place material on surfaces that are muddy, frozen, or contain frost.

G. Excavation carried below the elevation indicated on the Drawings shall be backfilled and compacted in accordance with these specifications.

H. Remove and properly dispose of unsatisfactory and excess material from the site.

3.02 CONSTRUCTION STAKING

A. Provide construction staking as indicated in paragraph 4.03 of the General Conditions. Engineer will only provide key reference points and benchmarks.

B. Contractor shall report to Engineer whenever a reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations. Contractor shall be responsible for the accurate replacement or relocation of such reference points or property monuments by a registered professional surveyor in the State of North Carolina.

3.03 PROTECTION OF UNDERGROUND FACILITIES

A. Refer to paragraph 5.05 of the General Conditions and 5.05.A.2 of the Supplementary Conditions concerning the protection of Underground Facilities.

B. Approximate locations of existing underground facilities at the site are indicated on the Drawings based on information available to the Engineer. Engineer and Owner do not take responsibility for the accuracy of the information.

3.04 WATER CONTROL

A. Inspect the site prior to mobilizing to determine the appropriate equipment for site grading and foundation work.

B. Perform work to prevent surface water from accumulating in excavations, and unfinished fill areas. Perform grading and excavation so the work area and affected operations shall be continually and effectively drained.

C. Install a dewatering system prior to excavating beneath the ground water table. Maintain the water table approximately 2 feet below the bottom of the excavation.

D. Maintain dewatering until backfilling has proceeded above the natural ground water level and the structural weight is sufficient to prevent "floating" of the structure. Provide a job superintendent experienced in dewatering work.

E. Water from dewatering operations must be disposed of in accordance with the North Carolina Sedimentation Pollution Control Act.

3.05 USE OF EXPLOSIVES

A. Explosives may not be used on the Project.

3.06 TOPSOIL

A. Strip topsoil from areas to be disturbed to a depth of 8 inches and stockpile separate from other excavated material. Locate topsoil so that the material can be used readily for the finished grading. Protect and maintain topsoil until needed. Place topsoil after completion of work in accordance with Section, Lawns and Grasses.

3.07 SITE GRADING

A. Proofroll exposed soils following topsoil stripping with a partially loaded tandem axle dump truck to identify unsuitable subgrade areas as determined by the Engineer. Unsuitable areas will be repaired in place or undercut to firm soils as directed by the Engineer. Payment for in place repair or undercutting and backfilling of unsuitable areas shall be as indicated in the Measurement and Payment paragraph.

B. Perform undercutting of unsuitable soils with a backhoe top loading dump truck or similar equipment approved for the use by the Engineer. Backfill undercut areas immediately.

C. In-Place repair shall consist of discing and recompaction of existing soils to a depth of approximately 12 inches.

D. Site grading shall be unclassified except as specifically indicated otherwise. Perform grading within the limits of the Project. Finished surface shall conform to the grades and cross sections indicated on the Drawings and be uniformly sloped for a positive drainage away from structures.

E. Excavate rock encountered in cut sections to a depth of 6 inches below finished subgrade and backfill with satisfactory material.

F. Scarify the existing subgrade surface to a minimum depth of 6 inches and recompact if subgrade density is less than the degree of compaction for the proposed fill material. Plow or bench existing ground surfaces steeper than one vertical to four horizontal in such a manner that the fill material will bond with or be keyed to the existing surface. Use compaction equipment suitable for the soil being compacted. Moisten or aerate material as necessary to obtain the optimum moisture

content within plus or minus one percent to obtain specified compaction.

G. Soils used for fill and backfill shall be satisfactory soils classified SP, SM, or SW in accordance with ASTM D2487. Dry or wet soil as necessary to maintain optimum moisture.

H. Place backfill and fill material in accordance with the following:
   1. Maximum uniform loose lifts: 8 inches
   2. Optimum moisture content: 11 - 14 percent
   3. Percent compaction at optimum moisture content:
      a. From ex. grade to within one (1) foot of struc. subgrade: 95
      b. Final foot to subgrade under floor slabs and pavements: 98
      c. Under sidewalks and grass areas: 90

I. Approved compacted subgrade that is disturbed by construction or adverse weather shall be scarified and re-compacted as specified previously. Re-compaction over utilities shall be by hand tamping.

3.08 FILL AND BACKFILL

A. Place and compact fill and backfill material adjacent to structures in a manner that prevents wedging and eccentric loading on or against structures. Do not use equipment adjacent to structures that may overload structure. Backfill against structure only after concrete has attained the specified 28-day compressive strength.

B. Stone Base: Structures shall have a compacted crushed stone subgrade to the depth of 12 inches, unless otherwise directed by Engineer.

3.09 EXCAVATION FOR STRUCTURES

A. Provide shoring or side slopes of excavations as necessary to protect workmen, and existing and new structures. Use, install, and remove shoring in accordance with State and Federal OSHA regulations.

B. Furnish, erect, and maintain required guardrails at exposed boundaries of excavation.

C. Perform excavation for utilities in accordance with Section, Trenching for Utilities. Install utilities to a minimum distance of five (5) feet beyond the face of the structure.

D. Make excavation to the dimensions and elevations for the structures as indicated on the Drawings. Extend excavation a sufficient distance from walls and footings to allow for placing and removal of forms.

E. Remove unsatisfactory material below required grade and replace with select backfill material as directed by Engineer.

F. Excavation carried below the depths indicated, without specific directions, shall be backfilled and compacted as specified herein to the proper grade. In excavations for footings the concrete shall be extended to the bottom of the over excavation. Work caused by over excavation shall be at the Contractor's expense.

G. The upper 9-inches of the subgrade after excavating for each structure should be compacted in place to at least 95% standard Proctor maximum dry density. The subgrade should be proof-rolled using a vibratory roller weighing a minimum of 10 tons (static load) until settlement from the last four complete passes does not exceed 1/8 inch. Any soft, unsuitable or unacceptable soils encountered in the

subgrade should be replaced with structural fill placed and compacted to 95% of the standard Proctor maximum dry density.

3.10 ROCK EXCAVATION

A. Notify Engineer immediately in the event that rock is encountered when the Contract requires payment by the unit price.

3.11 BORROW MATERIAL

A. Provide borrow material required for fill and backfill to bring the site to the elevations indicated on the Drawings. Borrow material shall be subject to the approval of the Engineer. Notify Engineer as to the site selected for inspection and approval prior to transporting borrow material to the site.

B. Obtain erosion control permit as necessary for borrow pit grading operations.

C. Provide soil analysis for each type of material from proposed borrow pit(s) for Engineer's approval prior to placing borrow material. Contractor shall do necessary work to bring the borrow material to within plus or minus 1-1/2 percent of the optimum moisture content. A minimum of one sample per structure shall be obtained for analysis.

3.12 MAINTENANCE AND STABILITY

A. Maintain fills and embankments to the grade and cross section indicated on the Drawings until the final completion and acceptance of the Project. Repair areas that are damaged.

3.13 DISPOSAL OF SURPLUS MATERIAL

A. Dispose of surplus material not required or unsuitable for filling, backfilling, or grading in an approved spoil area in accordance with local ordinances.

B. Obtain erosion control permit as necessary for disposal site(s).

3.14 SOIL TESTING

A. Provide the services of a soil-testing firm as specified in Section, Quality Control.

B. The testing laboratory soil specialist, as a minimum, shall be at the project site for the following:
   1. Monitor proofrolling of existing soils to determine requirements for undercutting unsuitable soils
   2. Monitor grading for the separation and wasting of unacceptable soils.
   3. Providing tests in accordance with the following schedule:
      a. Optimum moisture and laboratory maximum density: Provide one (1) test per type of material to determine optimum moisture and maximum density values in accordance with ASTM D698.
      b. Moisture content: Provide two (2) tests per day per type of material in accordance with ASTM D2216.
   4. Provide in-place field density in accordance with ASTM D1556 or other approved test and the following schedule:
      a. Provide a minimum of one (1) in-place bearing capacity test for every 1,200 sq ft of subgrade area under structures prior to the start of foundation work.
      b. While filling activities are in progress for structures and paved areas. Provide a minimum of one (1) in-place density test for every 1,200 sq ft of lift with a minimum of one (1) test for every lift.

c. Provide a minimum of one (1) in-place bearing capacity test for every 100 feet of foundation trench.

C. Submit test reports and soil specialist daily logs in accordance with Section, Quality Control.

END OF SECTION

SECTION 31 23 33

TRENCHING & BACKFILLING FOR UTILITIES

PART 1 GENERAL

1.01 SCOPE

A. Provide labor, equipment, and material to perform required excavating, backfilling, and compacting for utilities and related structures as specified herein and indicated on the Drawings. Work shall include, but not be limited to, the following:
   1. Survey staking as required for construction.
   2. Protection of existing improvements.
   3. Location of installed utilities.
   4. Dewatering.
   5. Excavating, backfilling, and compacting for utilities.
   6. Installation of warning / identification tape and tracer wire.
   7. Borrow material.
   8. Disposal of surplus material.
   9. Soil Testing.

1.02 RELATED SECTIONS

A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
   1. Section 31 11 00 Clearing and Grubbing
   2. Section 31 25 00 Erosion and Sedimentation Control
   3. Section 32 92 00 Lawns and Grasses
   4. Section 33 14 13 Water Distribution System

1.03 MEASUREMENT AND PAYMENT

A. Include work specified in this Section in the lump sum or unit price cost for the utility installation as appropriate unless specifically specified elsewhere in the specifications.

1.04 REFERENCED STANDARDS

A. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2012 (Reapproved 2021).

B. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2017, with Editorial Revision (2020).

C. N.C. Department of Transportation - Standard Specifications for Roads and Structures (NCDOT). July 2018 or latest

1.05 DEFINITIONS

A. Backfill: A specified material used in filling the excavated trench and placed at a specified degree of compaction.
   1. Materials: Materials listed herein include processed materials plus the soil classifications listed under the Unified Soil Classification System, (USCS) (Method ASTM D2487 and Practice D2488). The soil materials are grouped into five broad categories according to their suitability for this application.

a. Class I: Angular, 6 to 40-mm (1/4 to 1-1/2-in), graded stone, including a number of fill materials that have regional significance such as coral, slag, cinders, crushed stone, and crushed shell.
b. Class II: Coarse sands and gravels with maximum particle size of 40 mm (1-1/2 in.), including various graded sands and gravels containing small percentages of fines, generally granular and noncohesive, either wet or dry. Soil Types GW, GP, SW, and SP are included in this class.
c. Class III: Fine sand and clayey gravels, including fine sands, sand-clay mixtures, and gravel-clay mixtures. Soil Types GM, GC, SM, and SC are included in this class.
d. Class IV: Silt, silty clays, and clays, including inorganic clays and silts of medium to high plasticity and liquid limits. Soil Types MH, ML, CH and CL are included in this class. These materials shall not be used for bedding, haunching, or initial backfill.
e. Class V: This class includes the organic soils OL, OH, and PT as well as soils containing frozen earth, debris, rock larger than 40 mm (1 1/2 in.) in diameter, and other foreign materials. These materials shall not be used for bedding, haunching, or initial backfill.

2. Backfill Zones: Each backfill zone shall extend the full width of the trench bottom.
a. Foundation: Extending down from the bottom of bedding zone as defined below.
b. Pipe Embedment
1) Bedding: Extending from 4 inches below the pipe bottom to the pipe bottom for 30-inch diameter and smaller and 6 inches below the pipe bottom for pipes larger than 30 inches in diameter.
2) Haunching: Extending from the bedding (bottom of the pipe) to the pipe spring line.
3) Initial Backfill: Extending from the haunching (pipe spring line) to 1 foot above the top of the pipe.
c. Final Backfill: Extending from the initial backfill to the finish ground elevation.

B. Laying Conditions:
1. Type 1: Flat bottom trench with loose backfill.
2. Type 2: Flat bottom trench with backfill lightly consolidated to centerline of pipe.
3. Type 3: Pipe bedded in 4 inches minimum of loose soil and backfill lightly consolidated to top of pipe.
4. Type 4: Pipe bedded on Class I material to 1/8 pipe diameter (4 inch minimum) Backfill compacted to top of pipe a minimum of 80 percent of standard proctor.
5. Type 5: Pipe bedded in compacted Class I material to pipe centerline with 4-inch minimum under pipe. Backfill to top of pipe with Class I, II, or III and compact to 90 percent of standard proctor.

C. Compaction: Process of mechanically stabilizing a material by increasing its density at a controlled moisture condition. "Degree of compaction" shall be expressed as a percentage of the maximum dry density obtained by the test procedure presented in ASTM ASTM D698 (Standard Proctor).

D. Excavation: The removal of soil or rock to obtain a specified depth or elevation.

E. Hard Material: Solid, homogeneous material which is not included in the definition of "rock" but which may require the use of heavy excavation equipment with ripper teeth. Amount must exceed 1 cubic yard in volume. Material having a standard

penetration resistance as determined by ASTM D1586 between 60 and 150 blows per foot is defined as "hard material."

F. Lift: Layer of soil placed on top of a previously prepared or placed soil.

G. Rock: Solid, homogeneous material which cannot be removed without the systematic drilling and blasting exceeding 1 cubic yard in volume. Material having a standard penetration resistance as determined by ASTM D1586 greater than 150 blows per foot is defined as "rock." Removal of "hard material" will not be considered rock excavation because of intermittent drilling and blasting that is performed merely to increase production.

H. Pipe Springline: A line running horizontally through the center of the pipe.

I. Topsoil: Natural, friable soil, representative of productive soils in the vicinity of the site. Topsoil shall be free from roots, stones larger than 1 inch, objectionable weed seeds, toxic substances, and materials that hinder grading, planting, and maintenance operations.

1.06 SUBMITTALS

A. Submit the following in accordance with Section, Submittal Procedures:
   1. Catalog Data: Submit manufacturer's standard drawings or catalog cuts for the following. Clearly indicate equipment to be furnished for the Project including options to be provided.
      a. Warning / Identification tape.
   2. Test Reports: Submit for the following:
      a. Moisture-density relations of soils.
      b. Field moisture content.
      c. Soil classification.
      d. In-place field density.
      e. Geotechnical engineer's daily field reports.

PART 2 PRODUCTS

2.01 STONE

A. Class I material shall be #67 or #78M stone in accordance with NCDOT specifications Section 1005, General Requirements for Aggregate.

2.02 WARNING AND IDENTIFICATION TAPE

A. Tape shall be a minimum 3-inch wide polyethylene plastic tape or approved equal, manufactured specifically for identification of buried utilities with means of enabling detection by a metal detector to a minimum depth of 3 feet. Tape shall be APWA color coded (ANSI Z535.1) and continuously imprinted with warning and identification markings in bold black letters to read "CAUTION - BURIED (utility) LINE BELOW" or approved similar wording. Color and printing shall be permanent, unaffected by moisture or soil and shall be as follows:

Utility	Color
Potable Water	Blue
Sanitary Gravity, Force Mains & Drains	Green
Electric	Red
Gas, Oil, Steam	Yellow
Communication, Alarms & Signals	Orange

Reclaimed Water, Irrigation	Purple
Proposed Excavation	White

B. Tape shall be by Blackburn Manufacturing, Pollardwater, or Reef Industries Inc.

2.03 TRACER WIRE

A. Tracer wire shall be #12 solid copper wire. All connections shall be by wire nuts and taped.

PART 3 EXECUTION

3.01 PROJECT SAFETY

A. Contractor is responsible for Project safety.

B. Perform work in conformance with applicable State and Federal safety regulations including, but not limited, to the following:
   1. North Carolina Safety and Health Standards for the Construction Industry (29CFR 1926 Subpart P).
   2. NC OSHA Industry Guide No. 14, Excavations.
   3. NC OSHA Industry Guide No. 20, Crane Safety.

C. Provide barriers, warning lights, and other protective devices at excavations as necessary for safety of workers and the public.

D. Provide sloping of bank, shoring, sheeting, or other means of maintaining the stability of the trench in accordance with the requirements of the Associated Contractor's Manual of Accident Prevention OSHA, Part 1926.P.

3.02 PROTECTION OF UNDERGROUND FACILITIES

A. Provide protection of Underground Facilities in accordance with paragraph 5.05 of the General Conditions.

B. Approximate locations of existing underground facilities at the site are indicated on the Drawings based on information available to the Engineer. Engineer and Owner do not take responsibility for the accuracy of the information.

C. A change in conditions may be considered due to the location of the existing facilities as allowed in the General Conditions paragraph 5.05.F. This does not include the cost for repair of damaged facilities not properly located in advance of construction.

D. Separation distances shall be in accordance with utilities requirements.

3.03 CONSTRUCTION STAKING

A. Provide construction staking as indicated in paragraph 4.03 of the General Conditions. Engineer will only provide key reference points and benchmarks.

B. Report to Engineer whenever a reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations. Contractor shall be responsible for the accurate replacement or relocation of such reference points or property monuments by a registered professional surveyor in the State of North Carolina.

3.04 LOCATION OF INSTALLED UTILITIES

A. Provide location for contract installed utilities as requested by third parties proposing to dig in the contract area until the date that the entire contract is recommended for final payment by Engineer to Owner.

3.05 WATER CONTROL

A. Prevent surface water from entering the trench.

B. When trench bottom is below the existing ground water table, install a dewatering system to maintain water table 1 foot below trench bottom. Provide a man experienced in dewatering work at the job site.

C. Maintain dewatering until backfilling has proceeded above the existing ground water level.

D. Dispose of water from dewatering operations in accordance with the North Carolina Sedimentation Pollution Control Act.

3.06 USE OF EXPLOSIVES

A. Explosives may not be used on the Project.

3.07 EXCAVATING

A. Excavation shall be by open cut, unless otherwise indicated on the Drawings or specified herein. Short sections of trench may be tunneled or direct bored with the approval of the Engineer.

B. Stockpile excavated material in such a manner that it will not obstruct the flow of runoff, streams, endanger Work, impair the use or appearance of existing facilities, or be detrimental to the completed Work.

C. Segregate excavated material so as to maintain material suitable for backfill separate from material that is unsuitable.

D. Trench dimensions at the pipe embedment and foundation zone unless noted otherwise shall be as follows:
   1. Minimum width: Pipe outside diameter plus 18 inches.
   2. Maximum width: Pipe outside diameter plus 24 inches.
   3. Sides shall be vertical to a minimum of one foot above the top of pipe.

E. Shape trench bedding to provide uniform bearing for the full pipe length. Bottom shall be free of protrusions that could cause point loading on pipe. Provide bell holes as required for properly making pipe joint.

F. Do not over excavate. Excavation below grade without approval of Engineer shall be backfilled with Class I material at no additional cost.

G. Undercut soils that become unsatisfactory by construction activity or by being left exposed to the weather and backfill with Class I material at no additional cost.

H. Remove shoring, bracing, and sheeting, unless otherwise noted, as the trench is backfilled. Engineer shall have the authority to require that the sheeting be left in place.

I. Excavation of trench shall not advance more than 200 feet ahead of the installation. In no case should the excavation extend beyond that which can be backfilled by the

end of the workday.

J. Correct unstable soil conditions encountered at trench foundation by one of the following methods:
   1. Excavate below grade as approved by Engineer and backfill with Class I material or approved substitute material. Costs associated with this work shall be handled as a change to the Contract Price in accordance with the Contract Documents.

K. Rock and Hard Material
   1. Excavate rock and hard material to a minimum depth of 4 inches below the pipe for pipes smaller than 30 inches and 6 inches for pipes 30 inches and larger.

L. Pressure Lines:
   1. Provide a minimum 3 feet of cover, unless indicated otherwise on the Drawings.
   2. Excavate trenches to provide vertical curve chords that will not exceed the pipe manufacturer's recommended joint deflection.
   3. Provide concrete thrust blocks having a compressive strength of 3,000 psi at 28 days at change in horizontal and vertical direction and reduction in the pipe size, unless other restraint systems are indicated on the Drawings. Cut trench sides vertical and square to receive concrete. Provide bearing area against trench wall as indicated on the Drawings.

M. Utility Structures: Provide a minimum of 12 inches below subgrade and backfill with Class I compacted to 95 percent maximum density. If the soil conditions are found to be unsuitable for structural stability of the structure, Engineer may require additional depth of Class I material.

3.08 BACKFILLING

A. Weather Limitations: Proceed with backfill operations based on the following weather conditions:
   1. Temperature must be above freezing and rising.
   2. In windy, hot, or arid conditions with a high rate of evaporation add moisture to the material to maintain the optimum moisture content.
   3. Do not proceed in rain or on saturated subgrade.
   4. Do not place material on surfaces that are muddy, frozen, or contain frost.

B. General
   1. Maintain backfill operation within 200 feet from pipe laying operation.
   2. Backfill trench to existing ground surface with select excavated material at the specified compaction.
   3. If excavated material is unsuitable to obtain specified compaction, provide suitable off-site borrow material for backfill.
   4. Re-excavate trenches improperly compacted. Backfill and compact as specified.
   5. Provide appropriate tamping equipment, and water to obtain proper moisture content, to achieve specified compaction of backfill.
   6. Conduct operation of heavy equipment above pipe installation as to prevent damage to pipe.
   7. Install warning / identification tape over utilities. Bury tape one foot below finished grade above the utility. -
   8. Install tracer wire for non-metallic pipe. Bury tracer wire with pipe. Wire shall be looped into valve boxes to allow access for direct contact location.

C. Backfill in pipe embedment zone (bedding, haunching, and initial backfill).

1. General:
    a. Backfill with material as specified below. Material shall be free from objects larger than 2 inches.
    b. Where rock and hard material has been excavated below pipe bottom, backfill and compact bedding with Class I material. Class II or III material may be used for bedding with Engineer's approval.
    c. Place backfill material to assure placement of material under pipe haunches.
    d. Take care during placement and compacting of material to avoid movement of pipe.
2. Place backfill in bedding and haunching zones in 6 inch maximum lifts and compact to 90 percent density. Place initial backfill in one lift do not compact. Provide backfill material in pipe embedment zone as specified below.
    a. Pressure Lines (Flexible and Rigid Pipe)
        1) Excavation in Class I, Class II, and Class III soils suitable for bedding, the bedding surface shall provide a firm foundation of uniform density. Backfill with select excavated material.
        2) Excavation in Class IV or Class V, running water, and other unstable soil conditions, excavate a minimum of 4 inches below pipe bottom and provide Class I material for bedding and haunch zone. Backfill with Class I, II, or III material in initial backfill.
    b. Gravity Storm Lines, Rigid pipe (concrete)
        1) Excavation in Class I, Class II, Class III, and stable Class IV soils suitable for bedding, the bedding surface shall provide a firm foundation of uniform density. Backfill with select excavated material.
        2) Excavation in Class V, unstable Class IV soils, running water, and other unstable soil conditions, excavate a minimum of 4 inches below pipe bottom and provide Class I material for bedding and haunch zone. Backfill with Class I, II, or III material in initial backfill.
        3) Depth 0 - 12 feet: Type 2 laying conditions same as for pressure pipe.

D. Final Backfill
1. Backfill with materials free of stones and free of debris larger than 6 inches in dimension. Place backfill in lifts not exceeding the thickness and compacted to the minimum density specified below.
2. Trench backfilled with noncohesive materials may be compacted with water flooding; except under roadways, shoulders of roadways, and other areas subject to vehicular movement, provided the method of compaction is approved by the Engineer and provides the degree of compaction required.
3. Lifts and density:
    a. Undeveloped areas (i.e., forests, fields, and, croplands): Trench may be filled with bulldozer blade provided material fall will not damage pipe. Mound soil over the trench area sufficiently to settle level over time. Degree of compaction shall be 85 percent.
    b. Lawns: Backfill in 12-inch lifts and compact to 90 percent. Top 12 inches shall be free of material with a dimension over 2 inches.
    c. Roads (including Rights-of-way), drives, parking areas (including areas within 20 feet), and adjacent to existing utilities: Backfill in 6 inch lifts compact to 95 percent.
    d. Within 20 feet of foundations: Backfill in 6-inch lifts compacted to 95 percent.

E. Utility Structures: Bring backfill to grade in even lifts on all sides. Lift depths and compaction densities shall be as specified according to area of installation for pipe above. Backfill against cast-in-place concrete structure only after concrete has attained the specified 28-day compressive strength.

3.09 SOIL TESTING

A. Provide services of a soil-testing firm as specified in Section 01 45 00, Quality Control.

B. Testing laboratory soil specialist, as a minimum, shall be at the project site for the following:
   1. Provide a minimum of one (1) in-place density test for every 1,000 lf of trench.

C. Density tests shall be made in accordance with ASTM D-698, Standard Proctor Method.

D. Submit test reports and soil specialist daily logs in accordance with Section 01 45 00, Quality Control.

E. Based on test results, make corrections, adjustments, and modifications of methods, materials, and moisture content for proper trench compaction.

3.10 PAVEMENT PATCHING

A. Repair damaged pavement structure.

B. Cut existing pavement for utility installation in straight lines generally parallel to the utility. Properly dispose of removed pavement structure.

C. Extend pavement patch 1 foot beyond each side of trench on firm subgrade. Slope new surface to drain.

D. Asphalt Pavements: Replace asphalt pavement with a pavement structure no less than as detailed on the Drawings. For roadways under NC Division of Highways jurisdiction, pavement shall be replaced in accordance with the requirements of the encroachment agreement.

E. Concrete Pavements: Replace concrete pavement with pavement structure equal to existing but no less than as detailed as Drawings. Concrete shall be minimum 3,000 psi. When existing concrete joint is within 5 feet of trench remove existing concrete to joint. Provide expansion joint at edge of existing concrete. Surface treatment shall match existing.

F. Curbs, Gutters, and Sidewalks: Replace curbs and gutters, and sidewalks removed or damaged with similar sections to match the existing. Remove to nearest existing joint.

G. Approval of Other Authorities: Pavements under the jurisdiction of the NC Division of Highways shall be subject to the approval of a representative of that Division.

3.11 GRADING AND CLEAN-UP:

A. Provide for testing and clean up as soon as practicable, so these operations do not lag far behind the pipe installation. Perform preliminary clean up and grading as soon as backfill is complete.

B. Provide positive drainage of finished grade and drain away from structures. Finished grade shall be reasonably smooth, compacted, free from irregular surface changes

and comparable to the adjacent existing ground surface.

C. Seed disturbed areas in accordance with Section, Lawns and Grasses.

D. Upon completion of backfilling, remove and properly dispose of excess material and waste.

END OF SECTION

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SECTION 31 25 00

EROSION AND SEDIMENTATION CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Work shall include, but not be limited to, the following:
   1. Erosion control at project site.
   2. Erosion control at borrows and disposal areas as required by Contractor. Cost shall include erosion control permits as necessary for borrow and disposal areas.
   3. Removal of surface debris.
   4. Temporary and permanent ground cover.
   5. Maintain and remove erosion control devices.
   6. Self Inspection and Monitoring

1.02 RELATED SECTIONS

A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
   1. Section 31 25 00, Erosion Control
   2. Section 32 92 00, Lawns and Grasses

1.03 REFERENCED STANDARDS

A. “Erosion and Sediment Control Planning and Design Manual,” issued by the N. C. Sedimentation Control Commission.

1.04 QUALITY ASSURANCE

A. Conform to 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.

B. Post a copy of the approved erosion control permit, furnished by Owner, at the site prior to starting work. Maintain a copy of the approved erosion control plan at the site.

C. Provide permanent ground cover as soon as possible, and no later than 15 working days after completion of work in a specific area.

1.05 WARRANTY

A. Contractor is liable for damages to public and private property and fines as may be placed on the Project by the governing agencies due to failure to provide adequate erosion control devices.

1.06 SUBMITTALS

A. Submit the following in accordance with Section, Submittal Procedures:
   1. Self Inspection Reports

PART 2 PRODUCTS

2.01 MATERIALS

A. Matting / Erosion Control Fabric (ECF): Matting and ECF shall be heavy jute mesh over mulch held in place by staples. Commercially available ECFs may be used upon approval of the engineer. Approval of fabrics will require manufacturer's design data regarding velocity, ditch slopes, method of installation, decay cycle, repair techniques, and grass growth enhancement characteristics.

B. Wire Staples: 16 gauge steel wire, with minimum of 3" top and 4" long legs.

C. Gravel for Stone Filters: #57 crushed stone.

D. Filter Fabric: 7-1/2 oz. burlap fabric or other silt filtering fabric.

E. Riprap:
   1. Class A: Stone shall conform to NCDOT standards and shall range in size from 2 to 6-inches with the stone gradation being equally distributed within the required size range.
   2. Class B: Stone shall conform to NCDOT standards and shall range in size from 5 to 12-inches with the stone gradation being equally distributed within the required size range.
   3. Type 1: Stone shall conform to NCDOT standards and shall range in size from 5 to 17-inches with the stone gradation being equally distributed within the required size range.

PART 3 EXECUTION

3.01 INSTALL EROSION CONTROL DEVICES

A. Install erosion control devices, which shall be in place and operational prior to other land disturbing activity.

B. After installing erosion control devices as indicated on the Drawings, verify that reasonable measures have been taken to prevent the sedimentation of nearby watercourses, existing and new facilities, and adjacent property.

C. Should Contractor believe that additional measures are necessary to adequately prevent erosion, immediately notify Engineer. If rain is predicted before the Engineer can be notified, take measures as necessary to prevent siltation of nearby water courses and work will be paid for as provided in the General Conditions.

D. After installing erosion control devices, request an inspection by the local agency having jurisdiction and the Engineer.

E. Incorporate permanent erosion control work into the project at the earliest practicable time. Coordinate temporary erosion control measures with permanent erosion control measures and other work on the project to assure effective and continuous erosion control throughout the construction and post construction period.

F. Maintain erosion control devices during construction until the disturbed areas are stabilized and the agency having jurisdiction and the Engineer have approved the removal of the erosion control devices.

3.02 BORROW AND DISPOSAL AREAS:

A. Obtain and pay for erosion control permit for borrow and disposal areas as required by Contractor.

B. Install and maintain erosion control devices in accordance with Contractor's approved plan.

3.03 MAINTENANCE

A. Inspect erosion control devices after each rainfall. Make required repairs immediately. Remove sediment deposits when deposits reach approximately one-half of the capacity of the erosion control device.

B. Respread accumulated sediments on the project site in a manner that will not adversely affect erosion control facilities and permanent ground cover.

C. Silt Fence: Should the filter fabric decompose or become ineffective before approval of its removal by the Engineer, replace fabric immediately at no additional cost to the Owner.

D. Temporary Construction Entrance: Maintain entrance in a condition that will prevent tracking or flow of mud onto public rights-of-way. This may require periodic top dressing with 2 inches of stone, as conditions require, at no additional cost to the Owner.

3.04 SEEDING

A. Disturbed areas not covered by new construction shall be seeded.

B. Provide temporary and permanent seeding in accordance with Section, Lawns and Grasses.

3.05 STABILIZATION AND CLEAN-UP

A. Remove erosion control devices upon the approval of the permanent stabilization of this site by the agency having jurisdiction of the area and the Engineer. Dress sediment deposits remaining in place after the erosion control devices are removed to conform to the existing grade, prepared and seeded. Include cost of removal and cleanup in the cost of the installation of the device.

END OF SECTION

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SECTION 32 01 18

ASPHALT PAVEMENT PATCHING

PART 1 GENERAL

1.01 SCOPE

A. Provide pavement patching where marked in the field by the Owner and specified herein.

1.02 REFERENCED STANDARDS

A. N.C. State Dept. of Transportation - Standard Specifications for Roads and Structures (NC DOT), 1990.

1.03 SUBMITTALS

A. Shop Drawings: Submit four (4) copies of Certificate of Compliance that the materials used in the bituminous concrete mixer, and aggregate base course meet the requirements of this section for materials, mixing, and handling.

1.04 PROTECTION OF EXISTING PAVEMENT, AND CURB AND GUTTER

A. The existing paved area not to be patched, curb and gutter, and concrete pavement shall be protected by the Contractor. The Contractor and Owner shall inspect the entire site and mark all failed areas that are not designated for repair, and damaged curb and gutter, and concrete pavement. The Contractor shall remove any areas of pavement or concrete damage or failure that occurs during construction and provide a new patch at his own cost. The patch shall be the same as specified herein.

1.05 MEASUREMENT AND PAYMENT

A. All measurements shall be made by the Contractor in the presence of the Owner's representative. All quantities shall be agreed to as the work progresses and maintained in a daily log format signed by the Owner and Contractor.

B. Existing pavement removal and new patching: Payment shall be for all the labor, material and accessories required for a complete pavement repair for entire lane width including, but not limited to, the following:
   1. Pavement saw cutting.
   2. Existing pavement structure removal.
   3. Excavation to a depth of 10-inches below existing pavement surface.
   4. Compaction of existing subgrade.
   5. Placement of engineering fabric.
   6. Placement and compaction of 8-inches of ABC stone base.
   7. Tack coat.
   8. Placement and compaction of 2-inches of S9.5B asphalt pavement.
   9. Removal from site of all excess material.

C. Additional undercutting and backfilling: Payment for additional undercutting and backfilling shall be in accordance with the Contract unit price per cubic yard. Payment shall be for all the labor, material and accessories required for undercutting including, but not limited to, the following:
   1. Undercut excavation to the depth as directed by the Soils Engineer.
   2. Backfilling with approved material and compacting.

3. Removal from site of all excess material.

PART 2 PRODUCTS

2.01 MATERIALS AND MIXES

A. Engineering Fabric: Fabric shall comply with the requirements of NC DOT Section 1056 for Type 1 material.

B. Base Course: Aggregate base course shall comply with requirements of NC DOT Section 520.

C. Tack Coat: Conforming to materials and compositions required in Section 605 of the NC DOT specifications.

D. Bituminous Concrete Surface Course - Type S9.5B: Conforming to materials and composition required in Section 645 of the NC DOT specifications.

PART 3 EXECUTION

3.01 PREPARATION FOR PAVEMENT PATCHING

A. Verify areas outlined for pavement patching with Owner. Areas outlined should extend 5 feet into sound pavement.

B. Saw cut outlined areas designated for removal.

C. Remove the distressed pavement, and the underlying base course. The existing subgrade shall be removed to a minimum depth of 10-inches below the existing pavement surface.

D. Prior to placement of the aggregate, allow testing of the existing subgrade by a soil technician provided by the Owner.

E. Provide additional undercutting as required by the soils engineer and approved by the Owner. Additional undercutting shall be measured and approved by the Owner as the work progresses. Only undercutting that has been measured and approved prior to backfilling will be paid by the Owner.

F. The existing subgrade shall be compacted as directed by the soil technician using a plate tamp on a Ramex type compactor prior to backfilling or placement of new base course.

G. Compaction shall be to at least 95% maximum density Modified Proctor Method.

H. Maintain subgrade in satisfactory condition and properly drain until surface courses are placed.

I. Preparation, shaping, and compaction shall be in accordance with Section 500 of the NC DOT specifications.

3.02 ENGINEERING FABRIC

A. Install specified fabric over the subgrade as recommended by the material manufacturer.

3.03 AGGREGATE BASE COURSE

A. The stone base shall be constructed in accordance with the applicable paragraphs of Section 520 of the NC DOT specifications.

B. A minimum of 8-inches of ABC stone base should be placed and compacted to at least 100 percent of the dry density as defined by ASTM 1557 Modified Proctor Density.

3.04 TACK COAT

A. Application rates, method of application and curing shall be in accordance with the requirements of NC DOT specification Section 605.

3.05 BITUMINOUS CONCRETE SURFACE COURSE

A. Spreading, compaction, and finishing shall comply with the requirements of Sections 610 and 645 of the NC DOT specifications.

B. Compacted thickness shall be no less than the 2-inches of Type S9.5B.

END OF SECTION

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SECTION 32 12 12

PAVEMENT AND APPURTENANCES

PART 1 GENERAL

1.01 SCOPE

A. Provide pavement, curb and gutter, and sidewalk sections as indicated on the Drawings and specified herein. Construction shall conform with the lines, grades, thickness, and typical cross-section indicated on the Drawings.

B. Provide for the milling of the existing pavement.

1.02 RELATED SECTIONS

A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
   1. Section 31 20 00 Earth Moving

1.03 REFERENCED STANDARDS

A. The latest revision, at the time of bidding, of the publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
   1. N.C. Department of Transportation - Specifications for Roads and Structures (NCDOT). 2002

B. Paragraphs in the NCDOT standard regarding measurement and payment do not apply to this Project.

1.04 SUBMITTALS

A. Submit the following in accordance with Section, Submittal Procedures:
   1. Certificates of Compliance: Certificates shall attest that supplied products conform to the referenced standard and this specification, that all tests set forth in each applicable referenced publication have been performed, and that all test requirements have been met. Submit for each of the following materials:
      a. Asphalt Concrete
      b. Aggregate Base Course
      c. Pavement Marking Material

1.05 PROTECTION OF EXISTING PAVEMENT, CURB AND GUTTER, AND SIDEWALK

A. Existing pavement, curb and gutter, and sidewalks at the site are in good condition. Contractor, Owner, and Engineer shall inspect the entire site prior to the start of construction and mark existing damaged areas and note areas on Contractor's plan set to be used for the Record Drawings.

B. Protect existing pavement, curb and gutter, and sidewalks during construction.

C. Remove areas of existing curb and gutter, and sidewalks damaged during construction. Removal shall include to the nearest existing joint. Replace damaged areas with new curb and gutter, and sidewalks to match the existing section.

D. Remove areas of existing pavement damaged during construction. New pavement patch shall consist of re-stabilizing the subgrade, and providing 8 inches of ABC and 2 inches of SF9.5A asphalt to match existing pavement surface.

E. Repair damage to existing pavement, curb and gutter, and sidewalks.

PART 2 PRODUCTS

2.01 MATERIALS AND MIXES

A. Asphalt Concrete Base Course - Type B-25.0B: Conforming to materials and compositions required in NCDOT Section 610, Asphalt Concrete Plant Mix Pavements.

B. Tack Coat: Conforming to materials and compositions required in NCDOT Section 605, Asphalt Tack Coat.

C. Asphalt Concrete Surface Course - Type SF9.5A: Conforming to materials and composition required in NCDOT Section 610, Asphalt Concrete Plant Mix Pavements.

D. Concrete for Curb and Gutter, and Sidewalks: Conforming to materials and composition required in NCDOT Section 846, Concrete Curb, Curb and Gutter, Concrete Gutter, Shoulder Berm Gutter, Concrete Expressway Gutter, Concrete Valley Gutter and Concrete Flumes, and Section 848, Concrete Sidewalks and Driveways and Wheelchair Ramps.

E. Base Course: Aggregate base course shall comply with requirements of NCDOT Section 520, Aggregate Base Course.

F. Pavement Markings and Symbols: Conforming to materials and composition required in NCDOT Section 1205, Pavement Marking General Requirements.

G. Brick pavers: Type ASTM C62 grade SW, modular size 2-1/4-inch high, 4–inch wide, and 8-inch long.

PART 3 EXECUTION

3.01 PREPARATION OF SUBGRADE

A. Refer to applicable portions of Section, Earthwork.

B. Compaction shall be to at least 95 percent maximum density Standard Proctor Method.

C. Remove unsuitable material to a depth of one foot and replace with an approved material. Loosen exceptionally hard spots and re-compact. Finish subgrade to provide uniform bearing surface.

D. Maintain subgrade in satisfactory condition and properly drain until surface courses are placed.

E. Preparation, shaping, and compaction shall be in accordance with NCDOT Section 500, Fine Grading Subgrade, Shoulders, and Ditches.

3.02 AGGREGATE BASE COURSE

A. This applies to both the aggregate base course as indicated on the Drawings for paved and unpaved roads.

B. The stone base shall be constructed in accordance with the applicable paragraphs of NCDOT Section 520.

C. Compacted base shall be of the thickness indicated on the Drawings.

3.03 ASPHALT CONCRETE BASE COURSE

A. Spreading, compaction, and finishing shall comply with the requirements of NCDOT Section 610, Asphalt Concrete Plant Mix Pavements.

B. Compacted thickness shall be no less than the thickness indicated on the Drawings.

3.04 ASPHALT CONCRETE SURFACE COURSE

A. Spreading, compaction, and finishing shall comply with the requirements of NCDOT Section 610 Asphalt Concrete Plant Mix Pavements.

B. Compacted thickness shall be as indicated on the drawings.

3.05 TACK COAT

A. Application rates, method of application, and curing shall be in accordance with the requirements of NCDOT Section 605.

3.06 CONCRETE CURB & GUTTER

A. Provide concrete curb and gutter where indicated on the Drawings. Curb and Gutter shall conform to the section indicated on the Drawings.

B. Construct Curb and Gutter in accordance with NCDOT Section 846.

3.07 CONCRETE SIDEWALKS

A. Provide concrete sidewalks where indicated on the Drawings. Construction shall be in conformity with the materials, lines, grades, thickness, and typical section as indicated on the Drawings.

B. Construct sidewalks in accordance with NCDOT, Section 848, and the following specifications.

C. Space contraction joints equal to the width.

D. Place a 1/2 inch wide expansion joint at all intersections and wherever walks abut structures and other walks.

E. Place additional expansion joints at each fifth contraction joint.

F. Walks shall receive a light broom finish.

END OF SECTION

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SECTION 32 92 00

LAWNS AND GRASSES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Work shall include, but not be limited to, the following:
   1. Surface preparation of subsoil.
   2. Placing topsoil.
   3. Addition of lime and fertilizer.
   4. Seeding.
   5. Maintenance to produce a permanent stand of grass.

1.02 PAYMENT PROCEDURES

A. Base bid for the work on the specified quantities of lime, fertilizer, and seed. After the specified soil tests have been made, Engineer may vary specified quantities. Should the actual quantities applied in the field vary appreciably from those specified, an adjustment in the contract price may be made.

1.03 REFERENCES

A. N.C. Department of Agriculture - NCDA

B. U.S. Department of Agriculture - USDA

1.04 PERFORMANCE REQUIREMENT

A. Grassed area shall be considered established when it presents a green appearance from eye level 50 feet away and the grass is vigorous and growing well in each square foot of seeded area. It is not required that the seeded area be thick and heavy as an old established lawn.

B. Should the permanent seed not germinate and produce a strand of grass, reseed affected areas until a permanent stand is established.

1.05 SUBMITTALS

A. Not less than 6 weeks prior to seeding, obtain representative soil samples from areas to be seeded and deliver the properly packaged samples with an information sheet for each sample properly filled out to the Soils Division of the NC Department of Agriculture or a private laboratory. Based on the test results, submit to the Engineer a recommendation as to the quantity and type of lime, fertilizer and seed for the area covered by the test.

1.06 QUALITY ASSURANCE

A. Quality of fertilizer, lime, and seed, and operations in connection with the furnishing of this material, shall comply with the requirements of the N.C. Fertilizer, Lime and Seed Law; and with the requirements of the rules and, regulations adopted by the NC Department of Agriculture in accordance with the provisions of the said law.

B. Seed containers shall bear an official "Certified Seed" label as inspected by the N.C. Crop Improvement Association.

C. Packages for soil conditioners and fertilizer shall bear manufacturer's guaranteed analysis.

D. Do not apply lime, fertilizer or seed in strong wind, when the soil is extremely wet, or otherwise unworkable. No rolling shall be done if precipitation after seeding would make the operation detrimental to the seed bed.

1.07 DELIVERY, STORAGE, AND PROTECTION

A. Deliver grass seed mixture in sealed containers showing percentage of seed mix, year of production, net production, net weight, date of packaging, and location of packaging.

B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.08 MAINTENANCE SERVICE

A. Maintain seeded areas until grass is well established and exhibits a vigorous growing condition for a minimum of two cuttings. Mow grass at regular intervals to a maximum height of 3 inches. Hand clip where necessary.

B. Control growth of weeds. Apply herbicides in accordance with manufacturer’s instructions.

C. Water areas seeded between May 1 and July 15 at such intervals as to maintain the seeded area in a moist condition until the grass is established and accepted by the Engineer. Provide equipment to transport and distribute the water to the seeded areas. Areas seeded between September 1 and November 1 need not be irrigated beyond the initial watering specified above except that the Contractor may apply water at his own discretion.

PART 2 PRODUCTS

2.01 MATERIALS

A. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay or impurities, plants, weeds, and roots; pH value of minimum 5.4 and maximum of 7.0.

B. Lime: Ground Dolomitic agricultural limestone, not less than 85 percent total carbonates, ground so that 50 percent passes 100 mesh sieve and 90 percent passes 30 mesh sieve. Coarser material will be acceptable, provided the specified rates of application are increased proportionately on the basis of quantities passing No. 100 mesh sieve.

C. Fertilizer: Mixed, commercial, fertilizer containing 10-10-10 percentages of available nitrogen, phosphoric acid, and potash respectively, plus superphosphate with 20 percent P2O5 content. Fertilizer shall be dry, in granular (pellet) form, shall be delivered to the site in the manufacturer's original bag or container which shall be plainly marked as to formula.

D. Seed: Fresh seed guaranteed 95 percent pure with a minimum germination rate of 85 percent within one year of tests. Provide the following seed mixtures with lime and fertilizer in disturbed areas including NCDOT Rights-of-Way:
   1. Permanent Seeding (Maximum slope 3:1)

Planting Dates	Grass Type	Pounds / Acre
Aug. 15 - Nov. 1	Tall Fescue	300
Nov. 1 -Mar. 1	Tall Fescue	300
&	Abruzzi Rye	25
Mar. 1 - Apr. 15	Tall Fescue	300
Apr. 15 - Jun. 30	Hulled Common	25
	Bermudagrass	
Jul. 1 - Aug. 15**	Tall Fescue	120
&	Browntop Millet	35
&	Sorghum-Sudan Hybrids	30
Lime		4,000
Fertilizer	10-10-10	1,000
Mulch	Straw	4,000

** Temporary seeding, reseed according to optimum season for permanent seeding.

2. Permanent Seeding (Slopes from 3:1 to 2:1)

Planting Dates	Grass Type	Pounds / Acre
Mar 1 - June 1	Sericea Lespedeza	50
	&	300
Mar. 1 - Apr. 15	Add Tall Fescue	25
Mar. 1 - Jun. 30 or	Add Weeping Lovegrass	300
Mar. 1 - Jun. 30 or	Add Hulled Common	25
	Bermudagrass	
Jun. 1 - Sept. 1**	Tall Fescue	120
&	Browntop Millet	35
&	Sorghum-Sudan Hybrids	30
Sept. 1 - Mar. 1	Sericea Lespedeza	
	(unhulled-unscarified)	
&	Tall Fescue	
	&	
Nov. 1 - Mar. 1	Add Abruzzi Rye	
Lime		4,000
Fertilizer	10-10-10	1,000
Mulch	Straw	4,000

** Temporary seeding, reseed according to optimum season for permanent seeding.

E. Matting / Erosion Control Fabric (ECF): Matting and ECF shall be heavy jute mesh over mulch held in place by staples. Commercially available ECFs may be used upon approval of the engineer. Approval of fabrics will require manufacturer's design data regarding velocity, ditch slopes, method of installation, decay cycle, repair techniques, and grass growth enhancement characteristics.

F. Wire Staples: 16 gauge steel wire, with minimum of 3" top and 4" long legs.

G. Mulch: Threshed straw of oats, wheat, or rye; free from seed of obnoxious weeds; or clean salt hay. Straw which is fresh and excessively brittle or straw which is in such an advanced stage of decomposition as to smother or retard growth of grass will not be acceptable.

H. Water: Water shall be free from substances harmful to growth of grass.

PART 3 EXECUTION

3.01 PREPARATION OF SUBSOIL

A. Complete operations in the area to be seeded and prepare subsoil to eliminate uneven areas and low spots. Bring surface to the approximate design contours.

B. Scarify subsoil to a depth of 3 inches. Remove weeds, roots, stones and foreign materials 1-1/2 inches in diameter and larger.

3.02 PLACING TOPSOIL

A. Place topsoil during dry weather and on dry unfrozen subsoil.

B. Spread topsoil to a minimum depth of 4 inches. Remove vegetable matter and foreign non-organic material from topsoil while spreading. Grade surface to provide positive drainage and prevent water ponding. Lightly compact topsoil with at least one pass of a cultipacker or similar equipment

C. Maintain the finished surfaces by protecting, and replacing topsoil and subsoil as necessary until the area is accepted under the contract.

3.03 APPLICATION OF LIME

A. Liming shall be done immediately after grading has reached the fine grading stage, even though actual seeding may not be done until several months later.

B. Spread lime evenly by means of a mechanical distributor.

C. When lime is distributed by commercial liming dealers, sales slips showing the tonnage delivered shall be filed with the Engineer and shall show the full tonnage required for the acres treated.

D. Incorporate lime in the top 2 to 3 inches of soil by harrowing, disking, or other approved means.

3.04 APPLICATION OF FERTILIZER

A. Spread fertilizer not more than 2 weeks in advance of seeding.

B. To verify application rate, determine acreage to be fertilized and provide Engineer with total weight of fertilizer applied to the area.

C. Provide mechanical spreader for even distribution and spread half of the rate in one direction, and the other half at right angles to the first. Mix thoroughly into upper 2 to 3 inches of soil by disking, harrowing or other approved methods.

3.05 SEEDING

A. Accomplish seeding by means of an approved power-drawn seed drill, combination corrugated roller-seeder, approved hand operated mechanical seeder, or other approved methods to provide even distribution of seed.

B. Do not seed when ground is excessively wet or excessively dry. After seeding, roll area with a roller, not less than 18 inches in diameter and weighing not more than 210 pounds per foot of width. Upon completion of rolling, water area with a fine spray.

C. Immediately following seeding apply mulch or matting. Do not seed areas in excess of that which can be mulched on same day.

D. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches of soil depth

3.06 MULCHING AND MATTING

A. Apply mulch or matting as required to retain soil and grass, but no less then the following:
   1. Slopes from 0 to 20 percent by spreading a light cover of mulch over seeded area at the rate of not less than 85 lbs. per 1000 sq. ft.
   2. Slopes greater than 20 percent mulch with matting. Pin matting to the ground with wire staples at 5 foot intervals, immediately after seeding.
   3. Use tack to prevent disruption of mulch.

B. For tack use an asphalt tie-down of emulsified asphalt grade AE-3 or cut-back asphalt grade RC-2 or other approved equal. The application rate shall be 0.10 gal/sy (11 gal / 1000 sq ft). An approved jute mesh or net may be used in lieu of tacking straw mulch.

C. Other types of mulch and anchoring methods may be used upon approval by the Engineer.

3.07 PROTECTION

A. Protect seeded areas from damage by barricades, signs, and other appropriate means. Maintain and protect slopes from weather damage.

END OF SECTION

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SECTION 32 92 23

SODDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preparation of subsoil.

B. Fertilizing.

C. Sod installation.

D. Maintenance.

1.02 REFERENCES

A. ASPA (American Sod Producers Association) - Guideline Specifications to Sodding.

B. FS O-F-241 - Fertilizers, Mixed, Commercial.

1.03 DEFINITIONS

A. Weeds: Includes Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.04 SUBMITTALS AT PROJECT CLOSEOUT

A. Section 017000 - Execution and Closeout Requirements

B. Maintenance Data: Include maintenance instructions, cutting method and maximum grass height; types, application frequency, and recommended coverage of fertilizer.

1.05 QUALITY ASSURANCE

A. Sod: Minimum age of 18 months, with root development that will support its own weight without tearing, when suspended vertically by holding the upper two corners.

B. Submit sod certification for grass species and location of sod source.

C. Sod Producer: Company specializing in sod production and harvesting with minimum five years experience, and certified by the State of North Carolina.

D. Installer: Company approved by the sod producer.

1.06 REGULATORY REQUIREMENTS

A. Comply with regulatory agencies for fertilizer and herbicide composition.

1.07 DELIVERY, STORAGE AND PROTECTION

A. Section 016000 - Product Requirements

B. Deliver sod on pallets or in rolls. Protect exposed roots from dehydration.

C. Do not deliver more sod than can be laid within 24 hours.

1.08 PROJECT CONDITIONS

A. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.09 MAINTENANCE SERVICE

A. Maintain sodded areas immediately after placement until grass is well established and exhibits a vigorous growing condition for two cuttings.

PART 2 PRODUCTS

2.01 MATERIALS

A. Sod: ASPA Certified field grown grade; cultivated grass sod; type indicated below; with strong fibrous root system, free of stones, burned or bare spots; containing no more than 5 weeds per 1000 sq. ft.
   1. Bermudagrass: Tifway-419, TifTuf

B. Fertilizer: FS O-F-241, Type I, Grade A; recommended for turf, with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil, use complete (N-P-K) turf-grade fertilizer with a 3-1-2 or 4-1-2 ratio (eg. 12-4-8 or 16-4-8)

C. Water: Clean, fresh and free of substances or matter which could inhibit vigorous growth of grass.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that prepared soil base is ready to receive the work of this section.

3.02 PREPARATION OF SUBSOIL

A. Prepare subsoil and eliminate uneven areas and low spots.

B. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.

C. Remove foreign materials and treat area with Roundup or approved equal. Do not bury foreign material beneath areas to be sodded.

D. Remove contaminated subsoil.

E. Scarify subsoil a depth of 3 inches. Till in sand to improve drainage where necessary.

F. Repeat cultivation in areas where equipment has compacted subsoil.

3.03 FERTILIZING

A. Apply fertilizer in accordance with manufacturer's instructions.

B. Apply after smooth raking of subsoil and prior to installation of sod.

C. Apply fertilizer no more than 48 hours before laying sod.

D. Mix thoroughly into upper 2 inches (50 mm) of subsoil.

E. Lightly water to aid the dissipation of fertilizer.

3.04 LAYING SOD

A. Moisten prepared surface immediately prior to laying sod.

B. Lay sod within 24 hours after harvesting to prevent deterioration.

C. Lay sod tight with no open joints visible, and no overlapping; stagger end joints 12 inches minimum. Do not stretch or overlap sod pieces.

D. Lay smooth.

E. Place top elevation of sod 1/2 inch below adjoining paving or curbs.

F. On slopes 2:1 and steeper, lay sod perpendicular to slope and secure every row with wooden pegs at maximum 2 feet on center. Drive pegs flush with soil portion of sod.

G. Prior to placing sod on slopes exceeding 0.66:1, place wire mesh over topsoil. Securely anchor in place with wood pegs sunk firmly into the ground.

H. Water sodded areas immediately after installation. Saturate sod to 4 inches of soil.

I. After sod and soil have dried, roll sodded areas to ensure good bond between sod and soil and to remove minor depressions and irregularities.

3.05 MAINTENANCE

A. Mow grass at regular intervals to maintain at a height of ½-2 inches. Do not cut more than 1/3 of grass blade at any one mowing.

B. Neatly trim edges and hand clip where necessary.

C. Immediately remove clippings after mowing and trimming.

D. Water to prevent grass and soil from drying out.

E. Roll surface to remove minor depressions or irregularities.

F. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.

G. Immediately replace sod to areas which show deterioration or bare spots.

H. Protect sodded areas with warning signs during maintenance period.

END OF SECTION

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SECTION 32 93 00

PLANTS

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes provisions for the following items:
   1. Trees.
   2. Shrubs.
   3. Plants.
   4. Ground cover.
   5. Soil amendments.

1.02 QUALITY ASSURANCE

A. Subcontract landscape work to a single firm specializing in landscape work.

B. Subcontractor shall have been in related work for a minimum of 3 years.

C. General: Ship landscape materials with certificates of inspection required by governing authorities. Comply with regulations applicable to landscape materials.

D. Do not make substitutions. If specified landscape material is not obtainable, submit written proof of non-availability to Engineer, together with proposal for use of equivalent material.

E. Analysis and Standards: Package standard products with manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.

F. Trees, Shrubs and Plants: Provide trees, shrubs, and plants of quantity, size, genus, species, and variety shown and scheduled for landscape work and complying with recommendations and requirements of ANSI Z60.1 "American Standard for Nursery Stock". Provide healthy, vigorous stock, grown in recognized nursery in accordance with good horticultural practice and free of disease, insects, eggs, larvae, and defects such as knots, sun-scald, injuries, abrasions, or disfigurement.

G. Label at least one tree and one shrub of each variety with a securely attached waterproof tag bearing legible designation of botanical and common name.

H. Where formal arrangements or consecutive order of trees or shrubs are shown, select stock for uniform height and spread, and label with number to assure symmetry in planting.

I. Inspection: The Engineer may inspect trees and shrubs either at place of growth or at site before planting, for compliance with requirements for genus, species, variety, size, and quality. Engineer retains right to further inspect trees and shrubs for size and condition of balls and root systems, insects, injuries and latent defects, and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from project site.

1.03 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
   1. Plant and Material Certifications.
   2. Manufacturers or vendor's certified analysis for soil amendments and fertilizer materials.
   3. Label data substantiating that plants, trees, shrubs and planting materials comply with specified requirements.

1.04 DELIVERY, STORAGE AND HANDLING

A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.

B. Trees and Shrubs: Provide freshly dug trees and shrubs. Do not prune prior to delivery unless otherwise approved by Engineer. Do not bend or bind-tie trees or shrubs in such manner as to damage bark, break branches, or destroy natural shape. Provide protective covering during delivery. Do not drop balled and burlapped stock during delivery.

C. Deliver trees and shrubs after preparations for planting have been completed and plant immediately. If planting is delayed more than 6 hours after delivery, set trees and shrubs in shade, protect from weather and mechanical damage, and keep roots moist by covering with mulch, burlap or other acceptable means of retaining moisture.

D. Do not remove container-grown stock from containers until planting time.

1.05 JOB CONDITIONS

A. Utilities: Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as required. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.

B. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Engineer before planting.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not install plant material outside of the planting season months. Planting season month are between October and May.

B. Do not install plant material when wind velocity exceeds 30 mph (48 k/hr.).

1.07 WARRANTY

A. Warranty trees and shrubs until final acceptance.

B. Warranty trees and shrubs, for a period of one year after date of substantial completion, against defects including death and unsatisfactory growth, except for defects resulting from neglect by Owner, abuse or damage by others, or unusual phenomena or incidents which are beyond Landscape Installer's control.

C. Remove and replace trees, shrubs, or other plants found to be dead or in unhealthy condition during warranty period. Make replacements during growth season

following end of warranty period. Only one replacement (per tree, shrub or plant) will be required at end of warranty period, except for losses or replacements due to failure to comply with specified requirements.

PART 2 PRODUCTS

2.01 SOILS MATERIALS

A. Fertile, agricultural soil, typical for the locality, capable of sustaining vigorous plant growth, taken from drained site, free of subsoil, clay or impurities, plants, weeds and roots; minimum pH value of 5.4 and maximum of 7.0.

B. Excavate tree pits per construction details and backfill with a fertile sandy loam soil mixture. Add lime as necessary to achieve a pH

2.02 SOIL AMENDMENT MATERIALS

A. Fertilizer: Containing fifty percent (50%) of the elements derived from organic sources; of proportion necessary to eliminate deficiencies of soil as indicated in analysis.

B. Peat Moss: Shredded, loose, sphagnum moss; free of lumps, roots, inorganic material or acidic materials; minimum of 85 percent (85%) organic material measured by oven dry weight; pH range of 4 to 5; moisture content of thirty percent (30%).

C. Bone Meal: Raw, finely ground, commercial grade, minimum of three percent (3%) nitrogen and twenty percent (20%) phosphorous.

D. Lime: Ground limestone, dolomite type, minimum ninety-five percent (95%) carbonates.

E. Water: Clean, fresh, and free of substances or matter which could inhibit vigorous growth of plant material.

F. Herbicide: Ronstar-G and Round-Up, or approved equals.

G. Pesticide.

2.03 PLANT MATERIALS

A. Quality: Provide trees, shrubs, and other plants of minimum height/size, genus, species, and variety shown and scheduled for landscape work and complying with recommendations and requirements of ANSI Z60.1 "American Standard for Nursery Stock".

B. Deliver freshly dug plant materials after preparations for planting have been completed and install immediately. Protect bark, branches and root systems during handling. If planting is delayed, protect plant materials from damage and water thoroughly as needed. Heel-in balled and burlapped plant materials and keep container grown stock in containers until time of planting.

C. Deciduous Trees: Provide trees of height and caliper scheduled or shown and with branching configuration recommended by ANSI Z60.1 for type and species required. Provide single stem trees except where special forms are shown or listed. Provide field grown balled and burlapped (B&B) deciduous trees.

D. Shrubs: Provide shrubs of the minimum height shown or listed and with not less than minimum number of canes required by ANSI Z60.1 for type and height of shrub required. Provide field grown balled and burlapped (B&B) shrubs. Container grown shrubs will be acceptable subject to specified limitations for container grown stock.

2.04 MULCH MATERIALS

A. Mulching Material: Triple shredded brown hardwood mulch, one to two inches (1-2") in size, free of limbs, branches, pieces of wood and other debris and free of growth or germination inhibiting ingredients.

2.05 PLANTING ACCESSORIES:

A. Provide tree grates as specified on Drawings.

B. Anti-Desiccant: Emulsion type, film-forming agent designed to permit transpiration, but retard excessive loss of moisture from plants. Deliver in manufacturer's fully identified containers and mix in accordance with manufacturer's instructions.

C. Wrapping: Tree-wrap tape not less than 4-inches wide, designed to prevent borer damage and winter freezing.

D. Stakes and Guys: Provide 2" x 2" treated angled wood stakes and deadmen of sound new hardwood, treated softwood, or redwood, free of knot holes and other defects. Provide wire ties and guys of 2-strand, twisted, pliable galvanized iron wire, not lighter than 12 gauge. Provide not less than 1/2-inch diameter rubber or plastic hose, cut to required lengths and of uniform color, material, and size to protect tree trunks from damage by wires. Will consider substitution of flexible graying material made specifically for the graying; submit for review and approval.

2.06 SOURCE QUALITY CONTROL AND TESTS

A. Provide testing and analysis of soil before planting operations begin.

B. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble salt and organic matter; pH value.

C. Lime application rate and fertilizer formula rate shall be based on laboratory analysis. The Contractor should submit analysis and recommended application rates to the Engineer for approval. Minimum application rate for lime: four tenths (4/10) pound per cubic foot; minimum application rate for fertilizer: one-tenth (1/10) pound per cubic foot of 10-10-10.

PART 3 EXECUTION

3.01 PREPARATION - GENERAL

A. Verify location of public and private utility lines, above and below ground, prior to commencing installation. Contractor is responsible for damage made to utilities through the actions of his or her employees.

B. Verify that prepared subsoil is ready to receive work.

C. Saturate soil with water to test drainage.

D. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations and outline areas and secure Landscape Architect's acceptance before

start of planting work. Make minor adjustments as may be required.

3.02 PREPARATION OF PLANTING SOIL

A. Before working soil apply postemergent herbicide and wait. Minimum one week, or as per product label, before proceeding.

B. Planting soil shall be a uniform mixture of 50 percent by volume peat or other approved organic material such as decayed bark, sawdust or compost material with on-site soil.

C. Mix specified soil amendments and fertilizers with existing soil at rates specified. Delay mixing of fertilizer if planting will not follow placing of planting soil within a few days.

D. For pit and trench type backfill, mix planting soil prior to backfilling, and stockpile at site.

E. For planting beds, mix planting soil on surface of existing soil and mix thoroughly before planting.

3.03 PREPARATION OF SHRUB PLANTING AREAS

A. Loosen subgrade of planting bed areas to a minimum depth of 6-inches. Remove stones measuring over 1-1/2 inches in any dimension. Remove sticks, stones, rubbish, and other extraneous matter.

B. Spread planting soil mixture to minimum depth required to meet lines, grades, and elevations shown, after light rolling and natural settlement. Place approximately 1/2 of total amount of planting soil required. Work into top of loosened subgrade to create a transition layer; then place remainder of the planting soil.

C. Dig beds not less than 8-inches deep and mix with specified soil amendments and fertilizers. Plant beds are to be covered with 3-inches of organic material that is to be thoroughly mixed with existing soil by rototilling.

3.04 EXCAVATION FOR TREES AND SHRUBS

A. Excavate pits, beds, and trenches with vertical sides and with bottom of excavation slightly raised at center to provide proper drainage. Loosen hard subsoil in bottom of excavation. For tree pits backfill with soil mixture as specified compacting in 6 inches layers to achieve structural integrity.

B. Allow for 9-inch setting layer of planting soil mixture.

C. For balled and burlapped trees and shrubs, make excavations at least half again as wide as the ball diameter and equal to the ball depth.

D. For container grown stock, excavate as specified for balled and burlapped stock, adjusted to size of container width and depth. Thoroughly scarify plant ball on all container material.

E. Fill excavations for with water and allow water to percolate out prior to planting.

3.05 PLANTING TREES AND SHRUBS

A. Set balled and burlapped (B&B) stock, plumb and in center of pit or trench with top of ball at 2-inches higher than adjacent finished landscape grades. Remove non-biodegradable burlap ropes and wires from rootball. Fold biodegradable burlap back from rootball. When set, place additional backfill around base and sides of ball, and

work each layer to settle backfill and eliminate voids and air pockets. When excavation is approximately 2/3 full, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing final layer of backfill.

B. Saturate soil with water when pit or bed is half full and again when full.

C. Set container grown stock, as specified for balled burlapped stock.

D. Scarify plant balls.

E. Mulch pits, trenches, islands, and planted areas as shown on plan. Provide not less than 3-inches thickness of mulch. Keep mulch away from tree trunks and base of shrubs. Apply mulch uniformly, over entire plant bed or island.

F. Apply anti-desiccant, using power spray, to provide an adequate film over trunks, branches, stems, twigs and foliage. Apply for summer transplanting.

G. If deciduous trees or shrubs are moved when in full-leaf, spray with anti-desiccant at nursery before moving and spray again 2 weeks after planting.

H. Prune, thin out, and shape trees and shrubs only as necessary and in accordance with standard horticultural practice. Unless otherwise directed by Engineer, do not cut tree leaders, and remove only injured or dead branches, if any. Retain plants natural character.

I. Remove and replace excessively pruned or misformed stock resulting from improper pruning.

J. Wrap tree trunks. Start at ground and cover trunk to height of first branches and securely attach. Inspect tree trunks for injury, improper pruning and insect infestation and take corrective measures before wrapping.

K. Guy and stake trees immediately after planting. Brace plants vertically with plant protector wrapped guy wires and stakes as specified in details on Drawings.

3.06 PLACEMENT OF MULCH

A. Mulch Trees, shrubs, and groundcovers. Planting pits, planting saucer, planting islands and staked areas of individual trees and shrubs shall be mulched with triple shredded hardwood. Mulch shall be evenly distributed over the entire bed or island at a depth of 3-inches.

3.07 CLEANUP AND PROTECTION

A. During landscape work, keep pavements clean and work area in an orderly condition.

B. Protect landscape work and materials from damage due to landscape operations, operations by other contractors and trades, and trespassers. Maintain protection during installation. Treat, repair, or replace damaged landscape work as directed.

3.08 INSPECTION AND ACCEPTANCE

A. When landscape work is completed, Engineer will, upon request, inspect to determine acceptability.

B. Landscape work may be inspected for acceptance in portions as agreeable to Engineer, provided each portion of work offered for inspection is complete.

C. When inspected landscape work does not comply with requirements, replace rejected work until reinspected by Engineer and found to be acceptable. Remove rejected plants and materials promptly from project site.

END OF SECTION

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SECTION 33 01 02

DISINFECTION OF POTABLE WATER SYSTEM

PART 1 GENERAL

1.01 SCOPE

A. Provide labor, material, and equipment required for the disinfection by chlorination of the potable water system installed under this contract.

1.02 RELATED SECTIONS

A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
   1. Section 09 97 14 Painting, New Elevated Water Tank
   2. Section 33 14 13 Water Distribution System
   3. Section 33 16 10 Elevated Water Storage Tank

1.03 REFERENCE STANDARDS

A. AWWA B300 - Hypochlorites; 2018.

B. AWWA B301 - Liquid Chlorine; 2018.

C. AWWA C651 - Disinfecting Water Mains; 2014, with Addendum (2020).

D. AWWA C652 - Disinfection of Water-Storage Facilities; 2019.

1.04 SUBMITTALS

A. Submit the following in accordance with Section, Submittal Procedures:
   1. Test Report:
      a. Field test report indicating the measured chlorine residual.
      b. Bacteriological test.

PART 2 PRODUCTS

2.01 DISINFECTANT

A. The following products may be used as the disinfectant:
   1. Chlorine, liquid: AWWA B301
   2. Hypochlorite, calcium and sodium: AWWA B300

PART 3 EXECUTION

3.01 GENERAL

A. Provide a superintendent experienced in the required procedures for disinfecting with chlorine.

B. Obtain Owner's permission 48 hours prior to filling, flushing, and chlorinating of the potable water system. Owner shall operate valves connected to the existing water system.

C. Do not allow highly chlorinated water into the existing distribution system.

D. If there is any question that the chlorinated discharge will cause damage to the environment, a reducing agent shall be applied to the water to neutralize the residual chlorine. Federal, state, or local environmental regulations may require special provisions or permits prior to disposal of highly chlorinated water.

E. Perform disinfection and testing in presence of Engineer.

F. Test in the field for free chlorine residual:
   1. Sample location shall be the same as required for the bacteriological test samples.
   2. Immediately after injection of the chlorine solution. Sample shall have a chlorine residual as specified.
   3. Prior to flushing of the highly chlorinated water from the potable water system and a minimum of 24-hours after the initial injection of the chlorine. Sample shall have a minimum chlorine residual as specified.

3.02 POTABLE WATER MAINS

A. After satisfactory completion of the pressure test, disinfect new potable water mains and existing mains that have required repair in accordance with AWWA C651 and as specified herein. Disinfect water mains in a maximum length per day of 2,000 feet.

B. Connection to Existing System: Notify Owner 48 hours prior to making connections to the existing system. Thoroughly clean the existing water main exterior prior to the installation of tapping sleeves and corporation stops. Lightly dust with calcium hypochlorite powder the water main exterior and the interior surface of the tapping sleeve, and corporation stops.

C. Keep the pipe interior clean during construction to minimize the amount of water required for flushing and disinfection.

D. After satisfactory flushing of the main, disinfect by the injection of a chlorine solution. Induce chlorine in sufficient quantity to maintain a chlorine residual of at least 50 ppm throughout the system to be tested. Maintain the chlorine solution in the system for at least 24 hours.

E. Valves and Fire Hydrants: Open and close valves on the mains being disinfected a minimum of three times during the chlorine contact period and a minimum of three times during flushing. Fire hydrants and other appurtenances should receive special attention to insure proper disinfection.

F. Prior to flushing, the free chlorine residual shall be a minimum of 10 ppm. Flushing of the lines shall proceed until the lines contain the normal chlorine residual of the system.

3.03 POTABLE WATER STORAGE TANKS

A. Disinfect storage facilities prior to placing into service in accordance with AWWA C652 and as specified herein.

B. Allow for minimum paint system dry time as recommended by manufacturer prior to disinfection.

C. Remove material not part of the structural or operating facilities of the tank. Thoroughly clean interior surfaces and operating facilities of the storage tank using a high-pressure water jet, sweeping, scrubbing, or other means as approved by the

Engineer. Remove foreign material accumulated in this cleaning operation from the storage facility.

D. Following cleaning operation, check screened openings and put in satisfactory condition to prevent birds, insects, and other possible contaminants from entering the facility.

E. Disinfection by Spraying of Tank (AWWA C652, Method 2)
   1. Apply a solution of 200-ppm available chlorine directly to surfaces of the storage facility that would be in contact with water when the storage facility is full to the overflow elevation.
   2. Chlorine solution may be applied with suitable brushes or spray equipment. Solution shall thoroughly coat surfaces to be treated, including inlet and outlet piping, and shall be applied to any separate drain piping such that it will have available chlorine of not less than 10 ppm when filled with water. Overflow piping need not be disinfected.
   3. Disinfected surfaces shall remain in contact with strong chlorine solution for a minimum of 30 min.
   4. Purge highly chlorinated water form the tank and associated piping with water from an approved potable water source.

3.04 DISPOSAL OF CHLORINATED WATER

A. If there is any question that the chlorinated discharge will cause damage to the environment, a reducing agent shall be applied to the water to neutralize the residual chlorine. Federal, state, or local environmental regulations may require special provisions or permits prior to disposal of highly chlorinated water.

3.05 BACTERIOLOGICAL TESTING

A. Required location for obtaining water samples:
   1. Mains
      a. End of each main.
   2. Storage Tank: Outlet pipe

B. A laboratory, certified for the required testing by the State of North Carolina, shall collect the sample and perform the testing. The laboratory shall be the same for both sampling and testing.

C. Obtain two water samples at each specified location for bacteriological testing. Take the first sample immediately after flushing the chlorinated water and again in 24-hours.

D. Recommended additional samples. During the required sampling of water from the new system, it is recommended that samples be taken from the existing potable water source to determine if coliforms are present.

E. Care in sampling. No hose or fire hydrant shall be used for the collection of samples. Take samples from an approved sample tap consisting of a corporation stop installed in the main with a copper tube gooseneck assembly. Operation shall be such as to ensure that the sample collected is actually from water that has been in the new system.

F. Test samples for the presence of coliform organisms in accordance with the latest edition of Standard Methods for the Examination of Water and Wastewater. Testing method used shall be the multiple-tube fermentation technique, the membrane-filter technique, or presence/absence.

G. Test for odor. The water in the new system should also be tested to assure that no offensive odor exists due to chlorine reactions or excess chlorine residual.

H. If samples show the presence of coliform, procedure 1 or 2 described below shall be followed, with the approval of the Owner, before placing the unit or facility in service.
   1. Take repeat samples at least 24 hours apart until consecutive samples do not show the presence of coliform.
   2. Again, subject the system to chlorination and sampling as described in this section.

I. If samples are free of coliform, and with the approval of the Owner, the potable water system may be placed in service.

3.06 CONTAMINATION

A. If, in the opinion of the Engineer, possible contaminants have entered the existing water system, or water samples show the water in the existing system to be unsafe on completion of the work, the existing water system shall be disinfected as specified herein and shall include all contaminated components. Disinfection of the existing system shall be coordinated with the Owner.

END OF SECTION

SECTION 33 14 13

WATER DISTRIBUTION SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Work under this section includes, but is not limited to, piping, valves, fire hydrants, water service line, and appurtenances for a complete potable water distribution system.

1.02 RELATED SECTIONS

A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
   1. Section 31 23 33 Trenching for Utilities
   2. Section 33 01 02 Disinfection of Potable Water System

1.03 REFERENCE STANDARDS

A. AWWA A100

B. AWWA C515

C. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Prevention Assemblies; 2021.

D. ASSE 1015 - Performance Requirements for Double Check Backflow Prevention Assemblies; 2021.

E. ASSE 1060 - Performance Requirements for Outdoor Enclosures for Fluid Conveying Components; 2017 (Reaffirmed 2021).

F. AWWA A100 - Water Wells; 2020.

G. AWWA C104/A21.4 - Cement-Mortar Lining for Ductile Iron Pipe and Fittings; 2022.

H. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings; 2021.

I. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; 2023.

J. AWWA C150/A21.50 - Thickness Design of Ductile-Iron Pipe; 2021 (Reaffirmed 2023).

K. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast; 2023.

L. AWWA C153/A21.53 - Ductile-Iron Compact Fittings; 2019.

M. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service; 2023.

N. AWWA C515 - Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service; 2020.

O. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances; 2023.

P. NFPA 1 - Fire Code; 2024.

Q. NSF 61 - Drinking Water System Components - Health Effects; 2023, with Errata.

R. Publications are referred to in the text by basic designation only.
   1. American Water Works Association (AWWA)
   2. National Sanitation Foundation (NSF) Standards

S. SUBMITTALS
   1. Submit the following in accordance with Section, Submittal Procedures:
      a. Affidavit of Compliance: Affidavit shall attest that supplied products conform to the referenced standard and this specification and that all tests set forth in each applicable referenced publication have been performed and that all test requirements have been met. Submit for each of the following materials:
         1) Pipe and Fittings
            (a) Ductile iron
         2) Valves
            (a) Gate
            (b) Check
            (c) Air release
         3) Fire hydrants
      b. Catalog Data: Submit manufacturer's standard drawings or catalog cuts for the following. Clearly indicate equipment to be furnished for the Project including options to be provided.
         1) Pipe and Fittings
            (a) Ductile iron
         2) Valves
            (a) Gate
            (b) Check
            (c) Air release
         3) Valve boxes
            (a) Valve markers
            (b) Valve box collars
         4) Fire hydrants
         5) Pressure Gauge
      c. Reports:
         1) Field test report for each section of pipe for the following:
            (a) Measured chlorine residual
            (b) Bacteriological test
            (c) Pressure test
      d. Operation and Maintenance Instructions: Submit complete operation and maintenance manual for the following:
         1) Valves
         2) Fire hydrants

T. DELIVERY, STORAGE, AND HANDLING
   1. Provide a suitable pipe hook and/or rope sling properly certified for the load when handling the pipe with a crane, excavator, or backhoe. Lifting of the pipe shall be done in a vertical plane. Under no conditions shall the sling be allowed to pass through the pipe unless adequate measures are taken to prevent damage to both the tongue and groove ends.
   2. Deliver pipe in the field as near as practicable to the place where it is to be installed. Distribute pipe along the side of the trench opposite to the spoil bank. Where necessary to move the pipe longitudinally along the trench, it shall be done in such a manner as not to injure the pipe or coating.

3. Shield PVC pipe, PEX tubing and associated fittings stored on site from the sun's ultraviolet rays by suitable cover, or indoor storage.

PART 2 PRODUCTS

2.01 GENERAL

A. Products with surfaces intended to be in contact with the potable water shall be certified and listed in accordance with NSF 61 for potable water.

2.02 DUCTILE IRON PIPE

A. Pipe 3-inch to 64-inch shall conform to AWWA C150/A21.50, AWWA C151/A21.51 and the following requirements:
   1. Pipe Size(s): As indicated on the Drawings
      a. Nominal Laying Length: 20-feet
      b. Minimum Pressure class: 350
      c. Minimum Laying Condition: Type 2 See Section 31 23 33 Trenching for Utilities

B. Pipe Joints:
   1. Below ground service: Push-on or Mechanical conforming to AWWA C111/A21.11 and AWWA C151/A21.51.

C. Fittings: Conform to AWWA C110/A21.10, or AWWA C153/A21.53 and to the following requirements:
   1. Below ground service: Mechanical joints
   2. Material: Ductile Iron

D. Lining / Coating for Pipe & Fittings
   1. Interior Lining: AWWA C104/A21.4 Cement-mortar with seal coat and certified by NSF 61 .
   2. Exterior AWWA C151/A21.51 - Asphaltic coating approximately 1 mil thick.
   3. Fittings, Not to be Painted: In lieu of exterior asphaltic coating and interior cement lining, fittings may be provided with a 6-8 mil nominal thickness fusion bonded epoxy coating inside and out in conformance with AWWA C116 and certified by NSF 61.

E. Special Pipe Joints
   1. Restrained
      a. Provide restrained joint pipe at fittings and valves on water mains. Length of restrained pipe shall be as indicated on the Drawings. Restrained joints shall be Flex Ring and Lok-Ring (American), TR Flex and HP Lok (U.S. Pipe) or approved equal.
      b. Restrained joint pipe and fittings shall meet all AWWA standards and other requirements as specified above for standard ductile iron pipe and fittings unless addressed herein.
      c. Field made joints may be considered allowable if approved by the Engineer, but should be avoided where possible. Careful planning to locate field cuts in standard pipe sections is preferred. For field made joints in restrained piping, use field weldments or an insert equal to TR Flex Gripper Rings or approved equal. Gasket type field made joints will not be allowed.
      d. Restrained joint fittings shall be provided by the restrained joint pipe supplier where located within restrained joint pipe sections. Fittings shall

be of the same model / type as the pipe supplied from the pipe manufacturer.

e. Restrained joint fittings may be push-on joint type.
f. Megalugs, Series 1100, as manufactured by EBAA Iron Sales or approved equal shall be allowable for restraint where fittings or valves are not available with restrained joints from the pipe manufacturer.
g. Where additional fittings/valves are required for pipes not shown on Drawings, consult with Engineer for length of restrained joint pipe necessary each side of fittings/valve prior to installation of pipe/fitting.
h. Tees for hydrants do not have to be restrained along the main line except where they are within required restrained length of nearby fittings or valves.
i. Contractor shall develop a field layout schedule and drawing for restrained joint pipe installations.

2.03 VALVES

A. General: Valves shall meet the following requirements:
1. Size shall be as required for the pipe size and material as indicated on the Drawings and specified.
2. Open by counterclockwise rotation.
3. Provide an interior protective epoxy coating in accordance with AWWA C550 on ferrous surfaces in contact with the liquid.
4. Components in contact with the liquid shall be in compliance with NSF 61.
5. Standard system working pressure is 150 pressure psi.
6. Equip valves with a suitable means of operation.
7. Ends shall be mechanical joint for underground location and flanged joint for above ground location/underground utility vaults.
8. For buried valves over 5 feet deep, provide extension stems of cold rolled steel to bring the operating nut to within 2 feet of the ground surface. Extension stems shall also be provided as required for floor stands and to floor valve box.
9. Provide valve accessories as required for proper valve operation for valve locations as indicated on the Drawings and as recommended by valve manufacturer.
10. Similar valve types shall be of one manufacturer.

B. Gate Valves, Resilient-Seated: Gate valves 3-inch to 20-inch shall conform to AWWA C509 or AWWA C515 and to the following requirements:
1. O-ring stem seal on non-rising (NRS) stem valves.
2. Ends shall be mechanical joint for underground locations and flanged joint for above ground locations.
3. Valves shall be non-rising stem (NRS) with wrench nut for underground locations and Outside Screw and Yoke (OS&Y) with handwheel for above ground locations unless noted otherwise on the Drawings.
4. Valves 16-inch and larger shall be equipped with gearing to facilitate opening. Gear cases shall be extended or totally enclosed type. Geared valves shall be equipped with indicators to show the position of the gate in relation to the water.
5. Valves 16-inch and larger shall be equipped with a by-pass.
6. Special material for bolts and nuts.

C. Tapping Valves: Tapping valves shall conform to the specifications for the gate valves as indicated in this Section and the following:
1. Valve shall be specifically modified for the passage and clearance of the tapping machine cutter.

2. The mating end to the tapping sleeve shall be raised male surface to provide true alignment to the sleeve and tapping machine. The valve shall be compatible with the tapping sleeve.

2.04 AIR VALVES

A. Provide air valves in conformance with AWWA C512 and the following:
   1. Valve type shall be an Air Release valve.
      a. Inlet size: 2 inch
      b. Small orifice minimum: 1/8 inch
   2. Valve shall be designed for the following automatic operation:
      a. Release accumulated air while the main is in operation and under pressure.
   3. Valve shall be designed for a system pressure of 200 psi.
   4. Provide threaded inlet.
   5. Provide stainless steel ball float and wetted internal parts.
   6. Provide isolating bronze ball valve for connection to main line.

2.05 VALVE ACCESSORIES

A. Valve Box, Below Ground: Boxes shall be high strength cast iron of the screw or telescopic type. Box shall consist of a flare base section, center extension as required, and a top section with the word “WATER” cast in the cover. Length of box shall be such that full extension of box is not required at the depth of water main cover. Valve Boxes shall consist of no more than two sections; dis-similar materials (such as PVC pipe) are not permitted for deep installations

B. Extension Stem (if necessary): Stem shall be sized so as to transmit full torque from the operating mechanism to the valve stem without binding, twisting, or bending. Stem shall be made from extra heavy steel pipe, bronze, stainless steel, cold rolled steel, galvanized. Stem shall be complete with couplings for connection to valve and floor stand where required. When valve extension kits are used they must be as recommended by the valve manufacturer.

2.06 FIRE HYDRANTS

A. Fire hydrants shall conform to AWWA C502 and to the following requirements:
   1. Minimum valve opening of 4-1/2-inches
   2. Hydrant shall be furnished with a 5-inch Storz connection coupling on the steamer outlet.
   3. Storz connection shall be manugactured by the hydrant manufacturer and only come as part of the hydrant assembly. No adaptors for the Storz connection are allowed.
   4. Hydrant shall be be furnished with:
      a. Caps with chains for all connections
      b. National Standard Threads
      c. Mechanical joint
      d. 1-1/2-inch pentagon operating nut
      e. Open left
      f. Painted fire hydrant red
      g. Bronze to bronze seating
      h. Minimum 4-feet bury depth with a break away ground line flange and break away rod coupling
   5. Hydrant bonnet shall be designed with a sealed oil or greasw reservoir with O-ring seals and a Teflon thrust bearing.

6. Hydrant caps shall be attached to the body of the hydrant with a minimum 2/0 twist link, heavy duty, non-kinking, machine chain.
7. Shall be designed and rated for a working pressure of 250-psi or greater.

2.07 THRUST BLOCKING

A. Provide concrete thrust blocking in accordance with the detail on the Drawings.

B. Thrust blocking is not required where restrained joint fittings and equivalent length of restrained joint pipe are used unless shown otherwise on the Drawings.

2.08 DISINFECTANT

A. The following products may be used as the disinfectant:
1. Chlorine, liquid: AWWA B301.
2. Hypochlorite, calcium and sodium: AWWA B300.

PART 3 EXECUTION

3.01 GENERAL

A. Pipe installation shall meet the following general guidelines:
1. Lay pipe in the presence of Engineer, unless specifically approved otherwise.
2. Handle pipe and accessories in accordance with manufacturer's recommendations. Take particular care not to damage pipe coatings.
3. Carefully inspect pipe immediately prior to laying. Do not use defective pipe. Replace pipe damaged during construction.
4. Lay pipe to grade and alignment indicated on the Drawings.
5. A minimum distance of 12 inches shall be maintained between the outside of the water main and the outside of other utilities.
6. Provide proper equipment for lowering pipe into trench.
7. Do not lay pipe in water or when the trench or weather conditions are unsuitable for the work.
8. Provide tight closure on pipe ends when work is not in progress.
9. Keep pipe interior free of foreign materials.
10. Clean bell and spigots before joining. Make joints and lubricate gasket in accordance with pipe manufacturer recommendations.
11. Disinfection of pipe during installation:
a. Soak gaskets for minimum of one hour in a 50 - 100 ppm hypochlorite solution prior to installation.
b. Mop bells and spigots of pipe, fittings and valves with a 50 - 100 ppm hypochlorite solution immediately prior to making joints.
12. Block fittings with concrete, or restrain as indicated on the Drawings or as required to prevent movement.

3.02 RELATION OF WATER MAINS TO NON-POTABLE WATER MAINS

A. For the purposes of this paragraph, sewer shall mean any existing or proposed gravity or force main used to convey sanitary or industrial process waste.

B. Lateral Separation of Sewers and Water Mains. Water mains shall be laid at least 10 feet laterally from existing or proposed sewers, unless local conditions or barriers prevent a 10-foot lateral separation, in which case:
1. The water main shall be laid in a separate trench, with the elevation of the bottom of the water main at least 18 inches above the top of the sewer; or

2. the water main shall be laid in the same trench as the sewer, with the water main located at one side on a bench of undisturbed earth and with the elevation of the bottom of the water main at least 18 inches above the top of the sewer.

C. Crossings. A water main that crosses a sewer shall be laid a minimum vertical distance of 18 inches from the outside of the water main and the outside of the sewer, either above or below the sewer, with preference to the water main located above the sewer. One full length of water pipe shall be located so that both joints will be as far from the sewer as possible.

D. Water Mains and Reclaimed Water Distribution Lines. Water lines shall be located at least 10 feet horizontally from or at least 18 inches above water pipes carrying treated and disinfected wastewater in reclaimed water distribution lines. Crossings shall be made in accordance with Paragraph (B) .

3.03 DUCTILE IRON PIPE

A. Install pipe in conformance with AWWA C600 and the following:
1. For laying pipe in a vertical or horizontal curve, each full length pipe may be deflected by the following offset distance, unless otherwise directed by the pipe manufacturer:
a. Push-on joint
1) 3 to 12-inch pipe: 14-inch offset
2) 14 to 36-inch pipe: 8-inch offset
b. Mechanical joint
1) 3 to 6-inch pipe: 20-inch offset
2) 8 to 12-inch pipe: 15-inch offset
3) 14 to 20-inch pipe: 8-inch offset
4) 24 to 36-inch pipe: 6-inch offset
2. For laying restrained joint pipe in a vertical or horizontal curve, except for horizontal directional drills (HDD), each full length pipe may be deflected by the following offset distance, unless otherwise directed by the manufacturer:
a. 6 to 12-inch pipe: 11-inch offset
b. 16 to 20-inch pipe: 7-inch offset
c. 24 to 30-inch pipe: 5-inch offset
d. 36-inch pipe: 4-inch offset
e. 42 to 48-inch pipe: 1 ¼ -inch offset

3.04 VALVES AND FITTINGS

A. Install buried valves on top of an 18-inch square, 3-inch thick, solid concrete pad (minimum dimensions). The concrete pad may be provided by a pre-cast manufacturer or cast-in-place in the field above grade. Concrete used for the pads shall be a minimum 3,000 psi mix. The pads may not be cast-in-place in the pipe trench. Connection to pipe shall be such that there shall be no stress at the joint caused by misalignment or inadequate support of pipe or valve.

B. Valve Box: Set a valve box over each buried valve. Support box so that no stress shall be transmitted to the valve or pipe line. Install box plumb and set top flush with finished grade. Operating nut shall be centered in box. Provide a 24-inch x 24-inch wide by 6-inch thick concrete pad at top of valve boxes outside paved areas.

C. Valve operation nut shall be within 24 inches of the top of box. Provide stem extension if necessary to bring operating nut to within 24 inches of the top of box.

D. Install fittings as recommended by the manufacturer. Fittings shall be blocked or otherwise restrained from movement.

E. Install valves, gates, and accessories indicated on the Drawings and in complete accordance with the manufacturer's recommendations.

F. Install air / vacuum valve inside a manhole.

3.05 HYDRANT

A. Set hydrant in accordance with detail on Drawings.

3.06 PAINTING

A. Equipment shall receive the manufacturer's standard coating for the intended application. Coatings shall be suitable for the intended application.

B. Repaint damaged paint surfaces.

C. Above ground piping and piping within vaults shall be painted in accordance with Section, Painting.

3.07 PRESSURE TESTING

A. Pressure test in accordance with AWWA C600 for ductile iron pipe and AWWA C605 and AWWA M23 for PVC pipe and as specified herein

B. General:
1. The Engineer shall approve the source, quality, and method of disposal of water to be used in test procedures.
2. Obtain Owner's permission 48 hours prior to filling or flushing of pipe system with water from Owner's water system. Owner shall operate valves connected to the existing water system. Where large quantities of water may be required for flushing, Owner reserves the right to require that flushing be done at periods of low demand.
3. Clean and flush pipe system of foreign matter prior to testing.
4. Provide air vents at the high points in the line section to be tested for releasing of air during filling. Service corporation stops may be used for air vent when located at a high point. Include cost of air vents in price of testing. Leave corporation stops in place after testing and note locations on As-Built Drawings.
5. Allow concrete blocking to reach design strength prior to pressure testing.
6. Test main prior to installation of service taps.
7. Repair defects in the pipe system. Make repairs to the same standard as specified for the pipe system.
8. Retest repaired sections until acceptance.
9. Repair visible leaks regardless of the test results.
10. Pipe sections shall not be accepted and placed into service until specified test limits have been met.

C. Testing
1. Notify Owner and Engineer a minimum of 48 hours prior to testing.
2. Perform tests in the presence of Engineer.
3. Make pressure tests between valves. Furnish suitable test plugs where line ends in "free flow."
4. Upon completing a section of pipe between valves, test pipe by maintaining for a two-hour period a hydrostatic pressure of 200 psig.
5. Test pressure shall not vary by more than +/- 5 psi for the duration of the test.

6. No length of line shall be accepted if the leakage is greater than that determined by the following formula based on the appropriate test pressure: (Note: The below formulas are an algebraic reduction of the fomula from AWWA C605 for PVC pipe and AWWA C600 for DI of Q = (LD(sq root of P) / 148,000. Assumies 50 joints in 1,000 feet)
   Q = Allowable leakage per 1,000 feet of pipe in gallons per hour.
   D = Nominal diameter of the pipe in inches.
   100 psi: Q = D x 0.07
   150 psi: Q = D x 0.08
   200 psi: Q = D x 0.09
   250 psi: Q = D x 0.10

3.08 VALVE OPERATION

A. Prior to final acceptance provide competent personnel to operate each valve in presence of Engineer. Verify that valves are left in the open position.

END OF SECTION

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SECTION 33 16 10

ELEVATED WATER STORAGE TANK

PART 1 GENERAL

1.01 SCOPE

A. Provide labor, including the engineering design, materials, and equipment for the construction of an elevated water storage tank indicated on the Drawings, and specified herein.

B. The Project shall consist of the following tank.
   1. Name: Pleasant Plains Park 1.5 MG Elevated Tank
   2. Tank Style: Composite Tower

C. Work shall include, but not be limited to, the following major items:
   1. Geotechnical investigation at the site in addition to the report attached to Section, Geotechnical Data, of this Project Manual.
   2. Engineering design of tank foundation and the elevated water tank.
   3. Manufacturer, delivery, erection, and testing of tank components with appurtenances indicated in Contract Documents.
   4. Clearing, grading, excavating, and backfilling required for the tank construction including construction of an access road as required by the Tank Contractor.
   5. Erosion control measures indicated on the Drawings at the tank site are to be installed by the Tank Contractor including the temporary and permanent seeding of areas disturbed by the Tank Contractor.
   6. Construction of the foundation.
   7. Provide soil, concrete, and pile testing during construction for the tank foundation.
   8. Valve and piping as follows:
      a. Internal to tank
      b. Overflow to discharge
      c. Valve vault drain discharge.
      d. Water main from tank to distribution system as indicated on the Drawings.
   9. Valve vault and accessories.
   10. Painting.
   11. Disinfection.
   12. Electrical.

D. Base price in the Bid Form shall be for providing a pile foundation.

1.02 RELATED SECTIONS

A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
   1. 00 31 32 Geotechnical Data
   2. 09 97 14 Painting, New Elevated Water Tank
   3. 33 01 02 Disinfection of Potable Water Systems
   4. 33 14 13 Water Distribution System
   5. 40 50 53 Specialty Valves and Gates

1.03 REFERENCE STANDARDS

A. AWWA D100 - Welded Carbon Steel Tanks for Water Storage; 2021.

B. NSF 61 - Drinking Water System Components - Health Effects; 2023, with Errata.

C. AWWA D107 - Composite Elevated Tanks for Water Storage

D. American Concrete Institute (ACI) Standards
   1. ACI 371R Guide for the Analysis, Design and Construction of Concrete-Pedestal Water Towers

E. North Carolina State Building Code

F. Steel Structures Painting Council (SSPC)
   1. Steel Structures Painting Manual, Vol. 2, Systems and Specifications.

1.04 DEFINITIONS

A. Tank Contractor: as indicated in the Definitions of Document 00 73 00, Supplementary Conditions.

1.05 SYSTEM DESCRIPTION

A. Tank shall be designed and constructed in accordance with AWWA D100, American Welding Society, ACI 317R, NC State Building Codes and the following requirements:
   1. Tank volume: 1,500,000 Gals
   2. Top capacity level: See Drawings.
   3. Approximate ground elevation at the site is as indicated on the Drawings. The Structural Engineer shall determine the elevation of the top of the tank foundation.
   4. Head range: 38-feet, +/- 2.5 feet
   5. Pipe size:
      a. Inlet / Outlet: 20-inch
      b. Overflow: 12-inch minimum. Size overflow weir and pipe for a maximum flow of 3,750 gpm with a surcharge of 6-inches.
      c. Drain: Per manufacture's recommendations, but no less than that shown on the drawings
   6. Roof plate minimum thickness shall be1/4 inch and steel weld underside of roof and rafters.
   7. Use: Storage of potable water.
   8. Tank location is indicated on the Drawings.

1.06 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00, Submittal Procedures.
   1. Catalog Data: Submit manufacturer's standard drawings or catalog cuts for the following:
      a. Tank accessories and components including, but not limited to, ladders, hatches, ventilators, and level indicators.
      b. Safety climbing device.
   2. Shop Drawings: Submit project specific shop drawings for the following:
      a. Submit design plans and specifications for the tank foundation and elevated water tank signed and sealed by the Structural Engineer. Design plans shall indicate the following:
         1) Summary of structural design loading conditions including, but not limited to, seismic, wind. and snow requirements used for tank design including foundation.

2) Plans shall include a note that the design was based on the soils report included in this Project Manual, AWWA D100, ACI 317R, and the NC State Building Code.
3) Detail drawings indicating types, sizes, locations, and installation details of accessories.
4) Design for piping entrance riser.
5) Specifications for material and accessories to be used in the construction of the foundation and the tank. Specifications may be bound and submitted in a separate document.

b. Submittal of the above Shop Drawing shall be for the Owner's records and for review of the following items only by the Owner's Engineer:
1) Tank capacity
2) Top capacity level
3) Head range
4) Accessories

3. Test Reports for the Owner's record:
a. Weld tests, radiographic film.
b. Soil, pile, and concrete testing during construction.
c. Material testing firms daily logs.

4. Certificates of Compliance:
a. Design certification: After completion of construction, submit Structural Engineer's certification that the tank and foundation were constructed in conformance with the design plans in the paragraph above and these specifications.

5. Operation and Maintenance Instructions: Complete set of maintenance requirements and recommended maintenance schedule.

1.07 QUALITY ASSURANCE

A. Quality assurance shall be as required in Section 01 45 00, Quality Control and the following:
1. Design the elevated water tank and foundation for the loads as required in AWWA D100, ACI 317R, NC State Building Code, the soil conditions as indicated in the soils report included in this Project Manual, and the height as indicated on the Drawings.
2. Tank shall be constructed by one of the following or approved equal:
a. Composite: Caldwell Tanks, Inc., CBI Constructors, Inc., Landmark Structures, Phoenix Fabricators & Erectors LLC

PART 2 PRODUCTS

2.01 GENERAL TANK CHARACTERISTICS

A. Material that shall come in contact with the stored potable water shall be certified and listed in accordance with NSF 61.

B. Ladders, hatches, balconies, and guardrails shall conform to OSHA 29 CFR Part 1910, General Industry Standards

C. Tank:
1. Composite structure tank shall be a welded steel tank for the water storage supported by a concrete tank floor.

D. Tower: The tank shall be supported in one of the following method:

1. Composite: The composite tank shall have a steel water storage tank supported by a concrete support structure.

E. Provide a tank identification plate mounted on the tank riser / column. Mount plate 5 feet above grade level. Identification plate shall contain the following information:
   1. Tank Contractor with contractor's project or file number.
   2. Tank capacity.
   3. Height to overflow.
   4. Date erected.

F. Provide ladders as indicated for individual tank styles. Ladders for composite or fluted column tank styles shall be provided with platform landings (30' maximum spacing) as indicated on the drawings and specified herein. Equip ladders with an OSHA approved cable-type safety-climbing device for the full height of the ladder. Cable shall be a minimum of 3/8-inch high strength stainless steel and equipped with approved stainless steel safety clamps. Safety clamp or safety devices shall be stainless steel suitable for use with stainless steel cable. Cable shall be fastened at the top with approved fixed bracket and at the bottom with fixed bracket and compression spring to maintain tension in cable. Space intermediate cable support brackets at intervals not to exceed 30 feet. Provide two climbing safety harnesses with accessories.

G. Obstruction Lights: Provide a double obstruction light, Crouse-Hinds No. 43961 or equal, near the apex of the tank roof enclosed in aviation red obstruction-light globes as approved by F.A.A. Complete system with photoelectric cell, 3/4 inch conduit and wire to a junction box at the base of the tower.

2.02 STEEL TANK

A. The steel tank shall be all welded construction and shall be designed in accordance with applicable sections of AWWA D100. All exposed lap joints shall be fully seal welded on both sides.

B. All members shall be designed to safely withstand the maximum stress to which they may be subjected during erection and operation. The minimum thickness of any steel plate shall be 1/4 inch, except that plate used as a membrane over the structural concrete floor shall have a minimum thickness of 3/16 inch.

C. All structural members supporting the roof of the steel tank shall be flat bar or sealed square tubular sections. I-beams or other sections with horizontal projections may be used if the nominal depth is 10 inches or greater. Support beams shall be seal welded to the underside of the roof plate along the entire length of the beam.

D. Conical sections of the tank that support water shall be designed in accordance with AWWA D100.

2.03 CONCRETE SUPPORT STRUCTURE FOR COMPOSITE TOWER

A. The design, materials, construction and inspection of the concrete support structure shall conform to ACI 371 R, except as modified herein.

B. Construct support structure wall using a jump form process. Form system shall use curved, prefabricated form segments of the largest practical size to minimize panel joints. Concrete pour height shall be a minimum of 6 ft. and a maximum of 12 ft. Form panels shall extend the full height of the concrete pour using only vertical panel joints. Formwork shall be secured using bolts through the wall prior to concrete placement. Working platforms that allow safe access for inspection and

concrete placement shall be provided. Form facing material shall be metal, or plywood faced with plastic or fiberglass.

C. Form system shall incorporate a uniform pattern of vertical and horizontal rustications to provide architectural relief to the exterior wall surface. Construction joints and panel joints shall be located in rustications. Vertical panel joints shall be sealed using closures, which combine with the form pattern to prevent grout leakage and panel joint lines. The top of each concrete placement shall be finished with a grade strip. The vertical and horizontal rustications shall be proportioned and combined to impart a symmetrical architectural pattern to the completed structure. Form ties shall be located so as to impart a uniform patterned effect.

D. Formwork shall remain in place until the concrete strength is such that the removal operation and subsequent loads will not damage the concrete. Base formwork removal procedures and times on early-age test results. However, form movements shall be limited to a maximum of once per day.

E. Support wall concreting operations shall occur a maximum of once per day. Multiple form movements and concrete placements within a day are not permitted.

F. Surfaces of the concrete support structure shall receive the following finishes:
   1. Exterior exposed surfaces shall receive a smooth as-cast form finish. Finish these surfaces with a light brush blast to help provide a more uniform appearance.
   2. Interior exposed surfaces shall receive a rough -as-cast form finish. No additional finishing of the interior exposed surfaces is required.
   3. The top of the tank floor shall receive a float finish.

2.04 TANK APPURTENANCES FOR FLUTED AND COMPOSITE STYLE

A. Access Door: At the base of the tower provide a minimum 36" x 80" hollow metal man-door complete with hinges and a tumbler-type lock.

B. Access Tube: Provide a 4-foot diameter drywell located on the vertical centerline of the tank.

C. Provide the following ladders:
   1. Inside ladder extending from grade to the walkway.
   2. Access tube shall have inside and outside access ladders. Inside ladder shall extend from the walkway up to and through the drywell.

D. Walkway: Provide a walkway immediately below the tank extending from the drywall to the inside of the tower. Walkway shall be a minimum of 3 feet wide with 42-inch high guardrails with kick plate.

E. Roof Hatches: Provide two (2) 30-inch Roof Hatches; one for access to the roof from the access tube and the other to provide access to the tank itself.

F. Tank Manhole: Provide 30-inch manhole in the bottom of the tank with a ladder from the platform in the top of the pedestal to the manhole.

G. Tank Vent: Provide a suitable vent at the center of the tank roof to permit passage of air at a sufficient rate to prevent development of dangerous pressures or vacuum. Vent will be designed to prevent ingress of birds, insects or animals.

H. Tower Vents: Provide tower with adequate pipe vents. Vents will be screened to prevent ingress of birds and animals.

I. Painter's Ring: Provide an outside painter's ring near the top of the tower. Also provide a manway, 30 inches in diameter, near the top of the tower for access to the painter's ring.

J. Condensation Ceiling for Fluted Tower: A condensation ceiling shall be provided to collect and drain any condensation to the exterior of the tower.

K. Pipes:
   1. Pipes shall be the size indicated in the paragraph, System Description.
   2. Overflow: Provide a stainless steel overflow pipe fitted with a weir box. Overflow pipe shall be attached to the drywell and extend down inside the tower. At the base of the tower, the overflow pipe shall penetrate the foundation and extend to the headwall as indicated on the site plan. Provide a secured bronze 16 mesh insect screen on the outlet of the overflow. Equip overflow with a flap-valve at the discharge point.
   3. Riser: Provide stainless steel inlet pipe attached to the tower and extending from a flanged base elbow to a point near the walkway, then horizontally to the approximate center of the tank bottom, then vertically into the tank. Connections shall be welded. Riser pipe shall be equipped with an expansion joint at a point to be determined by the tank contractor.

L. Overhead Door: Provide a 12' wide x 12' high manually operated overhead steel rolling door to be located at grade level in the tower. Provide safety posts outside the door. Openings in the tower shall be properly reinforced. Loads imposed by the reinforced openings shall be accommodated in the foundation design.

M. Finish interior of the support structure with a 6-inch concrete slab. The design, materials and construction of the concrete slab shall be in accordance with ACI-371-R.

N. Provide a lightning protection system for the elevated tank structure and any roof mounted equipment that may be damaged by lightning. Install a system in accordance with NFPA 780 with materials that meet UL96 and UL 96a. Minimum requirements include two (2) 28 strand by 14 gauge copper conductors bonded to the steel tank 180 degrees apart. The conductors shall be fastened to the interior support wall at 3 foot minimum spacing, and shall terminate with buried 5/8 inch diamter by 8 ft. long copper clad ground rod.

PART 3 EXECUTION

3.01 DESIGN

A. Provide elevated tank and foundation design by the Structural Engineer.

B. Structural Loads: Design tank, tower, and foundation for the stricter of the load requirements of AWWA D100, ACI 371R and the NC State Building Code, Chapter 16, Structural Loads.

C. Geotechnical investigation of the tank site is attached to Section 00 31 32, Geotechnical Data, for the convenience of the Contractor. Additional soil investigation may be made at the site as required by the Contractor.

3.02 FOUNDATION

A. Provide foundation in accordance with Structural Engineer's design plans and specifications.

B. Provide soils, pile and concrete testing during construction by an independent testing firm with in house engineers registered in the State of North Carolina. Testing shall be as specified by the Structural Engineer with a minimum requirement of the following:
   1. Confirmation of soil bearing capacity for spread footings.
   2. Concrete strength tests.
   3. Pile bearing capacity.

C. Construct Foundations to provide at least 3 feet of pipe cover.

D. Backfill excavated areas with suitable material and compact to 85 percent standard Proctor.

E. Backfill excavated areas inside tower tanks support wall with suitable material and compacted to 95 percent standard Proctor.

3.03 PILE FOUNDATION

A. Provide the following testing and surveys by an independent testing firm when the foundation design includes piles.

B. Monitor pile load tests and keep daily reports of pile driving activities.

C. Perform a pre-construction survey of structures located within 1,000 feet of perimeter of the tank foundation. Survey shall provide notations on cracking, settling, and pre-existing conditions of the structures. At the end of the pile driving operations survey the existing structures. Provide survey report with photographs to the Engineer.

D. Provide recording seismographs. As a minimum locate one at the structure nearest to the tank site and one located at the tank site property line. Seismographs shall be operating during pile driving operations.

E. Contractor shall be fully responsible for damage to existing structures.

3.04 FABRICATION

A. Steel fabrication shall be in accordance with AWWA D100.

B. After fabrication clean surfaces as follows:
   1. Exterior: SSPC-SP 6 Commercial Blast Cleaning.
   2. Interior: SSPC-SP 10 Near White Metal Blast Cleaning.

C. After blasting clean surfaces of residue and dust.

D. Provide factory applied prime coat in accordance with Section 09 97 14, Painting, New Elevated Water Tank. Factory applied prime coat shall be of the same manufacturer and compatible with field applied paint coats.

3.05 ERECTION

A. Steel erection shall be in accordance with AWWA D100.

B. OSHA requirements shall be adhered to throughout the erection process.

C. Provide safety barriers to keep unauthorized persons away from the erection and storage area.

D. Workers shall be experienced in elevated tank erection. Welders shall be tested and weld joint records maintained in accordance with AWWA D100, Section 8.3.

E. After tank erection clean seams and adjacent areas of slag and splatter from the welding.

3.06 FIELD PAINTING

A. Paint elevated water tank in accordance with Section, 09 97 14 Painting, New Elevated Water Tank.

3.07 FOUNDATION TESTING

A. The services of a independent testing firm shall be provided as indicated in Section 01 45 00, Quality Control.

3.08 TANK TESTING

A. Water sall be provided as outlined in Section 01 50 00, Temporary Facilities and Controls

B. Determine quality of field welding by spot radiographic techniques. The number and location of the radiographs shall be as specified in AWWA D100, Section 11.

C. Repair defective welds in accordance with AWWA D100, Section 11.11.

D. After tank has been painted with the required minimum drying time the tank shall be hydrostatically tested. This may be completed during the disinfection process. Leaks shall be repaired and structure made watertight. Water level must be a minimum of two feet below joint being repaired.

3.09 DISINFECTION

A. Flush tank of foreign material

B. Provide tank disinfection: Section 33 01 02, Disinfection of Potable Water System

END OF SECTION

SECTION 40 05 53

SPECIALTY VALVES AND GATES

PART 1 GENERAL

1.01 SCOPE

A. The Section includes, but is not limited to, the following:
   1. Piston Actuated Valves
      a. Altitude Control
   2. Dismantling Joint

1.02 RELATED SECTIONS

A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
   1. 31 23 33 Trenching for Utilities
   2. 33 01 02 Disinfection of Potable Water Systems

1.03 REFERENCES

A. The latest revision, at the time of bidding, of the publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
   1. American Water Works Association (AWWA) Publications:
      a. C550 Protective Epoxy Interior Coatings for Valves and Hydrants
   2. National Sanitation Foundation (NSF)
      a. 61 Drinking Water System Components - Health Effects

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00, Submittal Procedures:
   1. Catalog Data: Submit manufacturer's standard drawings or catalog cuts for the following. The equipment to be furnished for the Project shall be clearly indicated, including all options to be provided.
      a. Piston Actuated Valves
      b. Dismantling Joint
   2. Test Reports: Upon testing of the installed system, field test reports shall be submitted in booklet form showing field tests performed to adjust each component and field tests performed to prove compliance with the specified performance criteria. Each test report shall indicate the final position of controls.
   3. Operation and Maintenance Instructions: Submit complete operation and maintenance manual for the total system.

PART 2 PRODUCTS

2.01 PISTON-ACTUATED VALVES

A. General: Provide hydraulically operated piston-actuated valves with the following requirements:
   1. Globe pattern valve as required for the location indicated on the Drawings.
   2. Inner valve assembly shall be top and bottom guided by means of replaceable bearing bushings.
   3. Repairs shall be possible without removing the valve from the line.

4. The minimum travel of the piston shall be equal to 25% of the diameter of the seat.
5. The piston shall be guided above and below the seat a distance equal to no less than 75% of the diameter of the seat.
6. Piston shall be cushioned and designed to insure positive closure.
7. Valve shall have a valve position indicator.
8. Ball valves provided on control piping for isolation.
9. Pilot valve, controlling main valve operation, shall have a range for adjustment. Pilot shall be easily accessible and can be removed with the main valve under pressure.
10. High efficiency strainer with blow off to protect pilot and speed control valves.
11. Valve shall be completely piped ready for installation.
12. Components in contact with the liquid shall be in compliance with NSF 61.
13. Full ported.
14. There shall be no metal to metal contacts within the valve.
15. Suitable for system working pressure of 150 psi with 100 psi surge pressure.
16. Power for solenoid(s): 120V, single phase, 60 Hz.
17. Solenoid enclosure: NEMA 4X
18. Material of construction:
    a. Valve body: Cast or ductile iron
    b. Trim: Bronze
    c. Flanges: 125 lb
19. Provide one set of spare parts for normal maintenance of each valve. Spare parts shall include, but not be limited to, seats, seals, and cups.
20. Valves shall be as manufactured by Golden Anderson, Ross Valves, or approved equal.

B. Altitude Control Valve
1. Description: Single-acting non-throttling type. Valve shall function to close off at tank high water level and open when system pressure is less than full tank head. Valve opening and closing shall be controlled by an electrically operated 3-way solenoid valve.
2. Normal operating conditions:
    a. Tank full: 616.80 feet MSL ; 615.92 NAVD88
    b. Approximate valve elevation: 400.50 feet NAVD88
3. Provide the following accessories:
    a. Limit switches to provide open and close status of valve.
    b. Speed control valve.
    c. 3-way electrically operated solenoid pilot valve. When solenoid valve is energized, altitude valve shall close.
    d. Check feature (cushioned) – Valve shall include an internal check feature.
    e. Anti-cavitation trim feature to prevent cavitation damage to valve internals.
    f. Relief pilot valve.

2.02 DISMANTLING JOINT

A. Dismantling joint to be provided as shown the Drawings. Dismantling joint shall have minimum three-inch adjustment and be NSF 61 certified. Joint shall meet AWWA Standard C219 and be suitable for ductile iron pipe to magnetic meter connection. ANSI Class 150 bolt pattern.

B. End ring and body to be steel per ASMT A 36. Flanged spool AWWA C207 Class E, compatible with ANSI Class 125 and 150 bolt circles. Pipe to be ASTM A 36 late 1% cold expanded to size.

C. Nuts, bolts, and tie rods to be all 316 stainless steel.

D. Provide EPDM gaskets

E. Exterior and interior joint end ring, body, and flange shall have a minimum 12 mil thickness of fusion epoxy coating for corrosion resistance. Coating shall be high quality thermosetting epoxy coating applied on a preheated surface by electrostatic spray application. Coating shall comply with AWWA C213 and be applied per coating manufacturer requirements. Coating to be AkzoNobel Resicoat R4-ES or equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install valves, gates, and accessories indicated on the Drawings and in complete accordance with the manufacturer's recommendations.

3.02 START UP SERVICES

A. Provide the services of manufacturer's representative to check the valve(s) installation, supervise initial start up, and instruct Owner's personnel in proper operation and maintenance of the valve(s). A minimum of one trip to the site will be required, consisting of a minimum of one 8 hour working day. Regardless of the time spent at the site, services will not be considered complete until the valve operates as intended for a minimum of one (1) week of operation.

B. Operate valve under actual field service to demonstrate that the valve performs to the specified flow capacity and head conditions. During the field test, make adjustments as necessary for proper operation.

C. The following valves shall require start up services:
   1. Altitude

D. Submit copy of tests and checks performed in the field, complete with recordings, where applicable, to the Engineer.

3.03 PAINTING

A. Equipment shall receive the manufacturer's standard coating for the intended application. Coatings shall be suitable in every way for the intended application.

END OF SECTION

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SECTION 40 70 00

INSTRUMENTATION

PART 1 GENERAL

1.01 SCOPE

A. Provide materials, equipment, labor, and services required to achieve a fully integrated and operational instrumentation system. Design and coordinate the instrument and control system for proper operation with related equipment and materials furnished under other sections of these Specifications and with related existing equipment.

B. Work shall include, but not be limited to, the provision of instruments, mounting hardware, appurtenant equipment, piping and accessories, specifically or reasonably implied as indicated on the Drawings and specified herein for a complete and operating instrumentation and monitoring system.

1.02 DEFINITION

A. Systems Equipment Manufacturer: The individual or corporation furnishing the equipment and services specified herein.

1.03 SYSTEM DESCRIPTION

A. Principal items of work are as follows:
   1. One (1) elevated tank level measurement assembly.

1.04 INSTRUMENTATION LOCATION AND FUNCTION

A. Elevated tank level measurement assembly.
   1. Function: Measure water level in the elevated tank and transmit 4-20 mA signal to telemetry system.
   2. Accuracy: 0.1% of span
   3. Measurement Range: 0-160 psi

1.05 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 Submittal Procedures:
   1. Certificates of Compliance: Certificates shall attest that supplied products conform to the referenced standard and this specification and that all tests set forth in each applicable referenced publication have been performed and that all test requirements have been met.
   2. Catalog Data: Submit manufacturer's standard drawings or catalog cuts for all componets of the tank level measuremetn assembly.
   3. Shop Drawings: Submit Project specific shop drawings for the following:
      a. Complete instrumentation panel layouts showing all equipment, piping, valves, electrical connections, and labeling with the detailed interconnection and installation data.
      b. Individual instrument layout showing equipment, piping, valves, electrical connections, and labeling with the detailed interconnection and installation data.

1.06 QUALITY ASSURANCE

A. Instrumentations are an integrated system, and as such shall be closely coordinated by the Contractor and suppliers to ensure satisfactory operation of the entire system.

B. Instrument manufacturer selected by the Contractor shall have the following qualifications and responsibilities to the Contractor:
   1. Be regularly engaged in type of work called for under these specifications for a minimum of 5 years.
   2. Employ competent personnel with qualifications necessary for design, manufacture, and testing of instruments to be furnished under these specifications.
   3. Assign an individual with a minimum of two years experience in the instrument design and installation as project manager.
   4. Designated project manager shall coordinate system design with equipment suppliers found in other sections of these specifications, which require interfacing with the system to be furnished under this section of the specifications.
   5. Be responsible for detailed design and proper functioning of the total system to be furnished under these specifications. As such; manufacturer shall, as required under these specifications, provide submittal data, operations and maintenance manuals, conduct all tests for calibration and operational demonstrations, technical supervision to the Contractor for installation and connection of equipment, and training of Owner's personnel in operation of the equipment. Send submittals to the Engineer through the Contractor for his review and approval.
   6. Shall have an in-house quality assurance organization with the capabilities of ensuring compliance with the standards set forth in these specifications.
   7. Have a permanent field service organization capable of providing service and maintenance of the system as called out in these specifications.
   8. Provide equipment under this section through one supplier whenever possible. Supplier shall be responsible for the details and coordination of the plant instrumentation to insure satisfactory operation.

C. For standardization, flow primaries, flow transmitters, square root extractors, level transmitters, loss of head transmitter, receivers, indicators, recorders, totalizers, and control station shall be by the same manufacturer wherever possible.

PART 2 PRODUCTS

2.01 GENERAL DESIGN CRITERIA

A. Completed instrumentation system shall provide the functions specified. Specifications and Drawings indicate major instrumentation equipment and functions required for the Project, but do not purport to cover all details necessary for a complete and operational instrumentation system. Provide appurtenances as necessary to provide a complete, and operational instrumentation system as required by instrumentation supplier. Equipment shall be the manufacturer's latest and proven design. Supplied instrumentation shall be compatible with associated equipment required in other specifications sections.

B. Finish: Components shall be finished to the manufacturer's standard for the service intended unless otherwise indicated in the specifications or Drawings. Components located in clusters shall be finished alike.

C. Provide an engraved laminated plastic nameplate to be mounted on or above the associated instrument. Tag instrument and components mounted on control panels on the backside with embossed plastic tape labels.

D. Mount control panels on floor or wall as indicated on the Drawings.
   1. Electrical components of the system shall operate on 120 volt, single phase, 60 cycle current, unless otherwise noted in the specifications.
   2. Energy Sources: Drawings and specifications indicate the energy sources that will be provided. Other devices necessary to obtain proper operation of the instrument system from these energy sources shall be furnished with the instrumentation.
   3. Surge and Transient Protection: Equipment shall be fully protected against voltage surges or transient voltages.
   4. Electrical enclosures shall be UL labeled, as a complete unit, following assembly. Internal wiring shall terminate at a terminal board. Wiring shall be sized in accordance with NEMA standards.

2.02 ELEVATED TANK LEVEL MEASUREMENT ASSEMBLY

A. The elevated tank level measurement assembly shall consist of a pressure transducer, pressure gage, air release valve, and isolation ball valves located in the elevated tank pedestal at the location shown on the drawings. The devices shall be plumbed with the input line such that a common ball drain valve can relieve pressure on the pressure gauge and pressure transducer simultaneously for purposes of checking and calibrating the pressure transducer.

B. The pressure gauge shall be dual scale psi/ft H2O contained in a heavy gauge aluminum case with textured black finish, 8 1/2" diameter dial with heavy flass lense, and 1/4-inch NPT bottom connection. Range shall be 0-160 PSI/370 FT H2O.

C. Pressure Transducer
   1. Housing: NEMA 4X fiberglass reinforced PBT plastic
   2. Sensing element: Piezo-resitive thinfilm cell
   3. Wetted parts: 316 and PH 17-4 stainless steel
   4. Display: 4-digit LCD with bar graph, trend and temp
   5. Accuracy: 0.1% of span
   6. Linearization: 32 points
   7. Power: 12-36 VDC
   8. Output: 4-20 mA, 2 wire
   9. Operating temp: -4 to 158 degrees F
   10. Process connection 1/2-inch NPT(M)

PART 3 EXECUTION

3.01 INSTALLATION

A. Instrumentation and controls shall be securely mounted as recommended by the equipment manufacturer.

B. Electrical and control wiring shall be installed in accordance with the applicable sections of these specifications.

3.02 START-UP SERVICES

A. Provide the services of the manufacturer's representative to check the equipment installation, supervise initial start-up, and instruct the Owner's personnel in the proper operation and maintenance of the equipment. A minimum of two separate trips to the site will be required, each consisting of a minimum of two 8-hour working day.

B. Regardless of the time spent at the site, the services will not be considered complete until the system operates as intended for a minimum of one (1) week of plant operation.

C. A copy of tests and checks performed in the field, complete with meter readings and recordings, where applicable, shall be submitted to the Engineer.

3.03 FIELD CALIBRATION

A. Instrumentation shall be calibrated in the presence of the Engineer in accordance with specified range and accuracy. Certified test reports shall be filed with the Engineer. Process calibration, such as volumetric drawdown tests on flows and level measurements, shall be conducted on measuring systems as requested by the Engineer.

B. No form of energy shall be turned on to any part of the instrumentation system prior to receipt of the Engineer of a certified statement of approval of the installation from the Contractor containing his supplier's authorization for turning on energy to the system.

3.04 PAINTING

A. Equipment shall be shop finished.

B. Provide sufficient touch-up paint to repair damage to the surface that may be incurred in shipping.

END OF SECTION