

**SPECIFICATIONS AND
BID DOCUMENTS
FOR
NUCOR SANITARY SEWER OUTFALL**

OWNER: City of Thomasville

Thomasville, North Carolina

City of Thomasville City Council:

Mayor: Raleigh York, Jr.

Council Members:

D. Hunter Thrift
Ronald Bratton
Jeannette Shepherd
Doug Hunt
Wendy Sellars
Lisa Shell
Payton Williams

City Manager: Michael Brandt
Assistant City Manager: Eddie Bowling
City Attorney: Misti Whitman
City Utilities Director: Morgan Huffman
City Clerk: Wendy Martin

Prepared by:



alley, williams, carmen & king, inc.
engineers and architects
740 chapel hill road - post office box 1179
burlington, north carolina 27216-1179

November 2023
Project No. 22087

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ADVERTISEMENT FOR BIDS

Sealed Bids will be received by the City of Thomasville (Owner), 10 Salem Street, Thomasville, NC 27360, (336) 475-4210, at the office of the City Utilities Director, until **2:00 P.M., Tuesday, December 5th, 2023**, for the Nucor Sanitary Sewer Outfall project.

At said place and time, and promptly thereafter, all Bids that have been duly received will be publicly opened and read aloud.

The proposed work is generally described as follows:

Nucor Sanitary Sewer Outfall:

- Installation of approximately 9,200 LF of 24" sanitary sewer outfall, including:
 - Approximately 550 LF of 36"/24" bore and jack railroad/road crossings
- Installation of approximately 2,200 LF of 4" HDPE forcemain, including:
 - Approximately 1,400 LF of 4" HDPE forcemain installed using directional drilling
- Installation of 100 GPM pump station, including electrical and mechanical components

All bids must be in accordance with the Bidding Documents on file at the office of Alley, Williams, Carmen & King, Inc., Post Office Box 1179 / 740 Chapel Hill Road, Burlington, NC 27216-1179.

Copies of the Bidding Documents have also been provided to iSqFt for viewing and downloading online.

Copies of Bidding Documents may be obtained from Alley, Williams, Carmen & King, Inc. at the address indicated herein, or a digital set can be downloaded at the following web address:

www.awck.com/resources/bidding-plans/ .

Bidders must be licensed contractors in the State of North Carolina, duly licensed accordingly for the appropriate section of Bid.

A 5% Bid security must accompany each Bid.

Each Successful Bidder will be required to furnish a Construction Performance Bond and a Construction Payment Bond as security for the faithful performance and the payment of all bids and obligations arising from the performance of the Contract.

A pre-bid meeting will be held at City of Thomasville City Hall, 10 Salem Street, Thomasville, NC 27360 on Tuesday, November 21st, 2023 at 10:00 A.M. All bidders are strongly encouraged to attend.

Owner reserves the right to reject any or all Bids, including without limitation the right to reject any or all nonconforming, nonresponsive, unbalanced, or conditional bids, and to reject the bid of any Bidder if Owner believes that it would not be in the best interest of Owner to make an award to that Bidder. Owner also reserves the right to waive informalities.

If the Contract is to be awarded, Owner will give the Successful Bidder a Notice of Award within the number of days set forth in the Bid Form.

City of Thomasville
Michael Brandt, City Manager

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INSTRUCTIONS TO BIDDERS

1. DEFINED TERMS. Terms used in these instructions to Bidders shall have the meanings assigned to them in the General Conditions and the Supplementary Conditions. Additional terms are defined as follows:

Owner. City of Thomasville
10 Salem Street
Thomasville, NC 27360
Attention: Mr. Morgan Huffman, Utilities Director
Telephone: (336) 475-4210

Engineer. Alley, Williams, Carmen & King, Inc.
740 Chapel Hill Road
Burlington, NC 27215
Attention: Mr. Clay Phillips, P.E.
Telephone: (336) 226-5534

2. COPIES OF BIDDING DOCUMENTS. Drawings, Specifications, and Bidding Documents are available for viewing in the offices of Alley, Williams, Carmen & King, Inc., 740 Chapel Hill Road, Burlington, NC 27215, or may be obtained from the engineer's website at the following link <http://www.awck.com/resources/bidding-plans/>

Complete sets of Bidding Documents must be used in preparing Bids; neither Owner nor Engineer assume any responsibility for errors or misrepresentations resulting from the use of incomplete sets of Bidding Documents.

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 confer a license or grant for any other use.

3. EXAMINATION OF CONTRACT DOCUMENTS AND SITE. It is the responsibility of each Bidder, before submitting a Bid, to (a) thoroughly examine the Contract Documents, (b) visit the site to become familiar with local conditions that may affect cost, progress, performance or furnishing of the Work. (c) consider Federal, State and Local Laws and Regulations that may affect cost, progress, performance, or furnishing of the work, (d) study and carefully correlate Bidder's observations with the Contract Documents, and (e) notify Engineer of all conflicts, errors, or discrepancies discovered by Bidder in the Contract Documents.

- 3.01 Subsurface Information. A report of Subsurface Exploration has not been prepared for this project. The Bidder, at Bidder's own expense, is encouraged to perform subsurface investigations within accessible areas. The Bidder, by way of establishing a unit price for the work within the contract agreement's price schedule or by otherwise submitting a bid on this project, has acknowledged that he is aware of the limited subsurface information or data, and has satisfied himself that his established unit price is sufficient to ensure the proper completion of the project and the conditions which may affect the work, including but not restricted to those bearing upon transportation, disposal, handling and storage of materials; rock excavation; water tables or similar conditions at the site; availability of labor, water, electric power, roads, and uncertainties of weather, river stages, or similar conditions at the site; and the character of equipment and facilities needed preliminary to and during prosecution of the work. Any failure by the CONTRACTOR to acquaint himself with these facts will not relieve him from responsibility for work. The OWNER and ENGINEER assume no responsibility nor will be liable for any conclusions or interpretations made by the CONTRACTOR on the basis of the information made available by the OWNER/ENGINEER.

On request 72 hours in advance, Owner will provide each Bidder access to the site to conduct limited explorations and tests as each Bidder deems necessary for submission of a Bid. Bidder shall not create any holes, bore, or clear any land and restore the site to its former conditions upon completion of such explorations. Arrangements for site visits shall be made by calling the Engineer.

- 3.02 Easements. All work shall be completed within existing rights-of-way or acquired easements. All additional lands and access thereto required for temporary construction ingress and egress, or storage of materials and equipment are to be provided by Contractor.
- 3.03 Bidder's Representation. The submission of a Bid will constitute an incontrovertible representation by Bidder that the Bidder has complied with every requirement concerning examination of the Contract Documents and the site, that without exception the Bid is premised upon performing and furnishing the work required by the Contract Documents, and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
4. INTERPRETATIONS AND ADDENDA. All questions about the meaning or intent of the Bidding Documents and the Contract Documents shall be submitted to Engineer in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda, mailed or delivered to all parties recorded by Engineer as having received the Bidding Documents. Questions received less than 10 days prior to the date for opening of Bids may not be answered. Only answers issued by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.
5. CONTRACT TIMES. The work shall be fully completed within one-hundred and eighty (180) calendar days from the date of Notice to Proceed. Submission of a Bid constitutes acceptance by the Bidder of the completion time as part of the requirements of this work.
6. LIQUIDATED DAMAGES. Provisions for liquidated damages are set forth in the Supplementary Conditions. The amount of liquidated damages set forth is \$2,500.00 per calendar day for each day work is not completed beyond the completion date.
7. SUBSTITUTE OR "OR-EQUAL" ITEMS. The procedure for submission of any application for review of substitute or "or-equal" items by Contractor and consideration by Engineer is set forth in Paragraph 6.05 of the General Conditions and may be supplemented in the project requirements section of Division 1, General Requirements. The Contract, if awarded, will be on the basis of materials and equipment indicated on the Drawings or specified in the Specifications. Application for review of substitute or "or equal" materials or equipment will not be considered by Engineer unless received by Engineer within 15 working days prior to the bid opening. Judgment concerning substitutes and "or-equal" reviews will be determined by the sole discretion of the Engineer.
8. BID FORM. The Bid Form is included in the Bidding Documents and must be completed in ink.

Bids by corporations must be executed in the corporate name by the president or vice-president (or other corporate officers accompanied by evidence of authority to sign for the corporation). Bids by partnerships must be executed in the partnership name and signed by a partner. Bids by joint ventures shall be signed by each participant in the joint venture or by a representative of the joint venture accompanied by evidence of authority to sign for the joint venture.

All blanks in the Bid Form shall be filled. A bid price shall be indicated for each section, bid item, alternative, adjustment unit price items, and unit price item listed therein, or the words “No Bid”, “No Charge” “No Change”, or other appropriate phrase shall be entered.

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

No alterations in Bids, or in the printed forms, by erasures, interpolations, or otherwise will be acceptable unless each such alteration is signed or initialed by the Bidder; if initialed, Owner may require the Bidder to identify any alteration so initialed.

9. **BID SECURITY**: Each bid must be accompanied by cash, certified check of the bidder, or a bid bond prepared on the Form of Bid Bond attached hereto, duly executed by the bidder as principal and having as surety thereon a Surety Company approved by the Owner, in the amount of 5% of the bid. Such cash, checks or bid bonds will be returned to all except the three lowest bidders within three days after the opening of bids, and the Owner and accepted bidder have executed the contract, or, if no award has been made within 90 days after the date of the opening of bids, upon demand of the bidder at any time thereafter, so long as he/she has not been notified of the acceptance of his/her bid.
10. **MODIFICATION AND WITHDRAWAL OF BIDS**. Bids may be modified or withdrawn by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.
 - 10.1 **Telegraphic Modification**: Telegraphic modification of bids is not permitted.
 - 10.2 **Bid Withdrawal**: Withdrawal of a bid, after bids are opened, will only be permitted under the provisions of laws and regulations.
11. **OPENING OF BIDS**. Bids will be publicly opened and read aloud. An abstract of the amount of the Base Bids and major alternatives (if any) will be made available to Bidders after the opening of Bids.
12. **BIDS TO REMAIN SUBJECT TO ACCEPTANCE**. All Bids will remain subject to acceptance for the number of days set forth in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the bid security prior to that date.
13. **AWARD OF CONTRACT**. Owner reserves the right to reject any or all Bids, including without limitation the rights to reject any or all nonconforming, nonresponsive, unbalanced, or conditional Bids, and to reject the Bid of any Bidder if Owner believes that it would not be in the best interest of Owner to make an award to that Bidder. Owner also reserves the right to waive informalities.

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

Owner may consider the qualifications and experience of Subcontractors, Suppliers, and other persons and organizations proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other persons and organizations must be submitted as provided in the Supplementary Conditions. Owner also may consider the operating costs, maintenance requirements, performance data, and guarantees of major items of materials and equipment proposed for incorporation in the Work when such data is required to be submitted prior to the Notice of Award.

If the Contract is to be awarded, it will be awarded to the lowest Bidder determined based on the Base Bid plus any Alternatives chosen by the Owner. Owner will decide on Alternatives, if any, to be added

to this contract based solely on available finances and what is deemed by the Owner to be in the best interest of the Town.

Low Bidder will be required to execute a Construction Contract included in the Bid Documents and will be required to provide the Town with a Certificate of Insurance in accordance with the Insurance Requirements hereafter described in Paragraph 16.

14. SIGNING OF AGREEMENT. When Owner gives a Notice of Award to the Successful Bidder, it will be accompanied by three (3) unsigned counterparts of the Agreement with all other written Contract Documents attached. Within the number of days set forth in the Bid Form, the Successful Bidder shall sign, leaving the dates blank, and deliver the required number of counterparts of the Agreement and attached documents to Owner with the required Bonds and Power of Attorney. Within twenty (20) days thereafter, Owner shall execute all copies of the Agreement and other Contract Documents submitted by Contractor (Successful Bidder); shall insert the date of contract on the Agreement, Bonds, and Power of Attorney; and shall return all copies to Engineer for review and distribution. Distribution of signed copies shall be as stipulated in the Agreement. Each counterpart is to be accompanied by a complete set of the Drawings with appropriate identification.
15. SALES AND USE TAX. Contractor will be required to report all sales tax for all materials incorporated into the project. A Sales Tax Report Form (form to be approved by Engineer) shall be submitted with all Applications for Payments (form to be approved by Engineer). Failure to not provide sales tax report will be justification for not processing Application for Payment.
16. LIABILITY INSURANCE REQUIREMENTS. Insurance requirements for the project shall be provided as follows:

The successful bidder shall be responsible for obtaining and maintaining adequate liability insurance to completely and fully protect City of Thomasville against all claims and actions arising out of any and all property damages or personal injury or death as shown in table below. The Contractor shall furnish proof of this liability insurance to be attached to the executed copies of the contract.

INSURANCE REQUIREMENTS LIMITS OF LIABILITY IN THOUSANDS (000)

	<u>Each Person</u>	<u>Each Occurrence</u>	<u>Aggregate</u>
<u>GENERAL LIABILITY</u>			
Personal Injury (Including Bodily Injury)	\$ 1,000	\$ 1,000	
Property Damage		\$ 1,000	\$ 1,000
Or			
Personal Injury (Including Bodily Injury) and Property Damage Combined		\$ 1,000	\$ 2,000
<u>AUTOMOBILE LIABILITY</u>			
Bodily Injury	\$ 1,000	\$ 1,000	
Property Damage		\$ 1,000	
Or			
Bodily Injury and Property Damage Combined		\$ 1,000	\$ 2,000
<u>OWNER'S PROTECTIVE LIABILITY*</u>			
Personal Injury (Including Bodily Injury)	\$ 1,000	\$ 1,000	
Property Damage		\$ 1,000	\$ 1,000
Or			
Personal Injury (Including Bodily Injury) and Property Damage Combined		\$ 1,000	\$ 2,000

- This is a special additional policy written for this project alone which specifically indemnifies the City of Thomasville as the Owner of this project.

** Note: THE CITY OF THOMASVILLE MUST BE NAMED AS AN ADDITIONAL NAMED INSURED ON THE CONTRACTOR'S POLICY. A WAIVER OF SUBROGATION SHALL ALSO APPLY TO THE ABOVE POLICIES.

WORKMEN'S COMPENSATION As required by law.

SPECIAL HAZARD Blasting (as required).

NOTE: WRITTEN NOTICE OF CANCELLATION MUST BE 30 DAYS AND STATED ON THE CERTIFICATE OF INSURANCE.

AGGREGATE AMOUNT MAY NOT INCLUDE EXCESS COVERAGES.

17. SAFETY. Within five (5) calendar days following the bid opening, the apparent low bidder shall submit to the Owner the following documents as evidence of the safety record of the Contractor:

- A. OSHA 200 Log for the Bidder's Firm for the last 5 years.
- B. Current Worker's Compensation Rating for Bidder's firm.

Review of these records shall be a part of evaluating the bidder's qualifications and a poor safety record may be cause for rejection of bid.

18. QUANTITIES AND UNIT PRICES. Owner reserves the right to delete any bid item or items in the bid prior to awarding the contract, except such deletions shall not reduce the total bid by more than 25% unless mutually agreed upon.

The Owner/Engineer reserves the right to make at any time after award of the contract such changes in quantities as are necessary to complete the project. Such changes in quantities shall not invalidate the contract nor release the surety, and the Contractor agrees to perform the work as changed at the unit prices agreed to in the Proposal.

The non-utilization or partial utilization of any bid item shall not serve as a claim for any contract or unit price adjustment as the Contractor shall be paid the unit price bid for the number of units actually installed, regardless if the final quantity is over or under the estimated quantity in the contract.

19. SUBMISSION OF BIDS. Bids shall be submitted at the time and place indicated in the Invitation to Bid, or the modified time and place indicated by Addendum. Bids shall be enclosed in an opaque sealed envelope or wrapping, addressed to:

City of Thomasville
10 Salem Street
Thomasville, NC 27360

Bids shall be marked with the name, license number, and address of the Bidder and shall be accompanied by the bid security and other required documents. If the Bid is sent through the mail or other delivery system, the sealed envelope shall be enclosed with the notation "BID ENCLOSED" on the face of it.

Each bid envelope shall be identified on the outside as to the appropriate bid submitted.

Bidders may bid on more than one section (if applicable) and include them on the same bid form, but shall so indicate on the outside of their bid as to which sections are included.

Bidders shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

Bids received after the time and date for receipt of Bids will be returned unopened.

Oral, telephone, facsimile, or telegraph Bids are invalid and will not receive consideration.

No Bidder may submit more than one Bid per contract. Multiple Bids under different names will not be accepted from one firm or association.

END OF SECTION

BID FORM:
NUCOR SANITARY SEWER OUTFALL

PROJECT IDENTIFICATION:

City of Thomasville
Nucor Sanitary Sewer Outfall
Sanitary Sewer Improvements

THIS BID IS SUBMITTED TO:

City of Thomasville
10 Salem Street
Thomasville, NC 27360

1. The undersigned bidder proposes and agrees, if this Bid is accepted, to enter into an agreement with the Owner in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents within the specified time and for the amount indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.
2. Bidder accepts all of the terms and conditions of the invitation to Bid and the Instructions to Bidders, including without limitation those dealing with the disposition of bid security. This Bid will remain subject to acceptance for 90 days after the day of bid opening. Bidder will sign and submit the Agreement with the Bonds and other documents required by the Bidding Documents within 20 days after the date of Owner's Notice of Award.
3. In submitting this Bid, Bidder represents that:
 - a. Bidder has examined copies of all the Bidding Documents and of the following addenda (receipt of all which is hereby acknowledged):

No. _____ Dated _____	No. _____ Dated _____
No. _____ Dated _____	No. _____ Dated _____
No. _____ Dated _____	No. _____ Dated _____
 - b. Bidder has visited the site and become familiar with and satisfied itself as to the general, local and site conditions that may affect cost, progress, performance and furnishing of the Work.
 - c. Bidder is familiar with and has satisfied itself as to all Federal, State and Local Laws and Regulations that may affect cost, progress, performance and furnishing of the Work.
 - d. Bidder acknowledges that Owner and Engineer do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Bidding Documents with respect to underground facilities at or contiguous to the site.
 - e. Bidder is aware of the general nature of Work to be performed by Owner and others at the site that relates to Work for which this Bid is submitted as indicated in the Contract Documents.

- f. Bidder has correlated the information known to Bidder, information and observations obtained from visits to the site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies and data with the Contract Documents.
- g. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Contract Documents and the written resolution thereof by Engineer is acceptable to Bidder, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this Bid is submitted.
- h. This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any person, firm or corporation to obtain for itself any advantage over any other Bidder or over Owner.
- i. Bidder shall list the manufacturer or supplier of the major items of equipment to be provided in this contract with their bid as provided on page BF-6. Any manufacturer not approved prior to the bid opening shall be grounds for the bid to be considered non-responsive and subject to rejection. Also list the major subcontractors.

4. Bidder will complete the Work for the following prices:

Nucor Sanitary Sewer Outfall					
Item No.	Description	Estimated Quantity	Unit	Unit Price	Bid Amount
1.	Mobilization	Lump Sum	LS	\$	\$
2.	Clearing and Grubbing	Lump Sum	LS	\$	\$
3.	Erosion Control	Lump Sum	LS	\$	\$
4.	Seeding and Mulching, including complete restoration of all disturbed areas to pre-construction condition or better	Lump Sum	LS	\$	\$
5.	Stabilization Stone, including undercut excavation below pipe bedding as authorized by Engineer	250	TN	\$	\$
6.	Incidental Stone, complete in place	250	TN	\$	\$
7.	24" PS46 PVC Sanitary Sewer Main: 0'-6' Trench, bedding, backfill, and testing; complete in place	1,050	LF	\$	\$
8.	24" PS46 PVC Sanitary Sewer Main: 6'-10' Trench, bedding, backfill, and testing; complete in place	3,060	LF	\$	\$
9.	24" PS46 PVC Sanitary Sewer Main: 10'-14' Trench, bedding, backfill, and testing; complete in place	690	LF	\$	\$
10.	24" PS115 PVC Sanitary Sewer Main: 6'-10' Trench, bedding, backfill, and testing; complete in place	470	LF	\$	\$

Item No.	Description	Estimated Quantity	Unit	Unit Price	Bid Amount
11.	24" PS115 PVC Sanitary Sewer Main: 10'-14' Trench, bedding, backfill, and testing; complete in place	1,740	LF	\$	\$
12.	24" PS115 PVC Sanitary Sewer Main: 14'-18' Trench, bedding, backfill, and testing; complete in place	1,020	LF	\$	\$
13.	24" PS115 PVC Sanitary Sewer Main: 18'-22' Trench, bedding, backfill, and testing; complete in place	330	LF	\$	\$
14.	Clarksbury Church Road Crossing, including bore pit/receiving pit excavation and backfill, bore and jack installation of 36" steel casing, installation of 24" Class 50 DIP restrained joint carrier pipe; complete in place	Lump Sum	LS	\$	\$
15.	CSX Railroad Corridor Crossing, including bore pit/receiving pit excavation and backfill, bore and jack installation of 36" steel casing, installation of 24" Class 56 DIP restrained joint carrier pipe; complete in place	Lump Sum	LS	\$	\$
16.	Storm Drain Crossing, including protection or replacement of existing storm drain pipe, installation of 24" Class 50 DIP, concrete saddle/flowable fill, and transition couplings; complete in place	2	EA	\$	\$
17.	New Cut Road Crossing, including bore pit/receiving pit excavation and backfill, bore and jack installation of 36" steel casing, installation of 24" Class 50 DIP restrained joint carrier pipe; complete in place	Lump Sum	LS	\$	\$
18.	Nucor Entrance Crossing, including bore pit/receiving pit excavation and backfill, bore and jack installation of 36" steel casing, installation of 24" Class 50 DIP restrained joint carrier pipe; complete in place	Lump Sum	LS	\$	\$
19.	Kepley Road Crossing, including bore pit/receiving pit excavation and backfill, bore and jack installation of 36" steel casing, installation of 24" Class 50 DIP restrained joint carrier pipe; complete in place	Lump Sum	LS	\$	\$
20.	5'-0" Diameter Precast Standard Concrete Manhole (0'-8' Depth), standard ring & cover, including testing; complete in place	16	EA	\$	\$
21.	5'-0" Diameter Precast Watertight Concrete Manhole (0'-8' Depth), watertight ring & cover, including testing; complete in place	9	EA	\$	\$
22.	5'-0" Diameter Precast Flat-Top Concrete Manhole (0'-8' Depth), watertight ring & cover & vent, including testing; complete in place	4	EA	\$	\$

Item No.	Description	Estimated Quantity	Unit	Unit Price	Bid Amount
23.	5'-0" Dia. Extra Depth Manhole (>8' depth)	115	VF	\$	\$
24.	Duplex Submersible Pump Station, including 5'-0" Dia. wetwell, valve vault, 5 HP submersible pumps, pump bases and rails, pump control panel, electrical gear, discharge piping and valves, air release valve, DIP forcemain, chainlink fence, and ABC access driveway; complete in place	Lump Sum	LS	\$	\$
25.	5'-0" Manhole/Wetwell Epoxy Liner System, including surface preparation, lining, and testing; complete in place	360	VF	\$	\$
26.	4" HDPE Forcemain, installed using open cut trenching, including HDPE fittings, complete in place	680	LF	\$	\$
27.	4" HDPE Forcemain, installed using horizontal directional drilling, complete in place	1,400	LF	\$	\$
28.	4" Forcemain connection to existing SSMH, including coring of existing SSMH, DIP forcemain stub and extension inside existing SSMH, complete in place	Lump Sum	LS	\$	\$
29.	Sewer Forcemain Air Release Valve Assembly, including precast manhole, 2" air release valve, DIP forcemain and associated adapters, and fittings, complete in place	1	EA	\$	\$
30.	4" Sanitary Sewer Service Tap and Cleanout – Connected to manhole, complete in place	2	EA	\$	\$
31.	4" Sanitary Sewer Service Tap and Cleanout – Connected to sewer main, complete in place	2	EA	\$	\$
32.	Concrete Pad Repair, including demolition of existing pad, stone base, dowels, and replacement of concrete pad, complete in place	160	SY	\$	\$
33.	Prime Lumber Entrance Repair, including installation of 4" compacted ABC stone, as directed by Engineer	300	TN	\$	\$
34.	Woven Wire Fence, including installation of woven wire fence and gate in accordance with NCDOT details, complete in place	60	LF	\$	\$
35.	Rock Excavation, including disposal of unsuitable material and replacement with suitable material, blast monitoring, pre- & post-blast survey; as approved by Engineer (\$30/CY minimum bid)	5,000	CY	\$	\$
36.	Contingency Allowance	Lump Sum	LS	\$100,000	\$100,000
TOTAL BID – NUCOR SANITARY SEWER OUTFALL					

5. Bidder agrees that the Work covered by the section or sections included in the contract award will be completed within the following number of days after the date when the Contract time commences to run as provided in Paragraph 18.02 of the General Conditions. Completion shall mean completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions.

Completion

180 Days

Bidder also agrees that should the bidder fail to accept a contract if awarded to them, or default on any other provisions of a contract award, the cash, certified check, or bid bond attached hereto shall become the property of the City of Thomasville as ascertained as liquidating damages for such default.

6. Communications concerning this Bid shall be sent to Bidder at the following address:

7. The terms used in this Bid, which are defined in the General Conditions included as part of the Contract Documents, have the meanings assigned to them in the General Conditions.
8. Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Bid items will be based on actual quantities provided, determined as provided in the contract documents.
9. Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the work within the times specified above, which shall be stated in the Agreement. Bidder agrees that as liquidated damages for delay (but not as a penalty), Bidder shall pay Owner **Two Thousand and Five Hundred Dollars (\$2,500.00)** for each day that expires after the time specified and in accordance with the Agreement.
10. The following documents are attached to and made a condition of the Bid:
 - A. Required Bid security in the form of Bid Bond – Certified Check (circle type of security provided);
 - B. Bidder is instructed to complete the Contractor’s Qualification Statement; see pages CQS-1 to CQS-3;
 - C. Bidder is instructed to complete E-Verify Affidavit; see page 000500-1;
 - D. Bidder is instructed to complete Iran Divestment Act Certification; see page IDA-1.
 - E. MBE Documentation; Good Faith Efforts Form Page 1 & 2
 - F. MBE Documentation; Table A

11. List of major equipment manufacturers and/or suppliers to be provided:

A. Pump Equipment _____

B. PVC Pipe _____

C. Precast Manholes/Structures _____

12. List of Subcontractors:

13. Estimated Sales Tax Amount: \$ _____ .00

SIGNATURE OF BIDDER

Contractor's License Number _____

License Expiration Date _____

If an Individual

By _____
(Signature of Individual)

doing business as _____

Business address _____

Phone No. _____ Date _____, 20_____

If a Partnership

By _____
(Firm Name)

(signature of general partner)

Business address _____

Phone No. _____ Date _____, 20_____

If a Corporation

By _____
(Corporation Name)

(signature of authorized person)

(title)

Business address _____

Phone No. _____ Date _____, 20_____

Fax No. _____

END OF SECTION

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CONTRACTOR'S QUALIFICATION STATEMENT

Regarding Project: City of Thomasville
Nucor Sanitary Sewer Outfall

Submitted by:

Name _____ Corporation

Firm _____ Partnership

Address _____ Individual

_____ Joint Venture

Telephone _____ Other

North Carolina License No. _____

A. How many years has your organization, under its present business name, been in business as a licensed contractor? _____

B. Under what other or former names has your organization operated during the past ten years?

Explain! _____

C. If a corporation, provide the following information:

Date of incorporation _____

State of incorporation _____

President's name _____

Secretary's name _____

Treasurer's name _____

D. If an individual, partnership, etc., provide the following information:

Date of organization _____

Names of all partners or principals

- E. Please list the projects (and locations) that your organization has completed in the past two years that are similar in scope to the project named above.

- F. Please give the name of the proposed field supervisor on the above named project and provide a summary of this person's experience and qualifications for such work.

Name _____

Qualifications _____

- G. What percentage of the above named project do you anticipate completing through the utilization of subcontractors? _____%.

Please list the areas of work and the names of subcontractors that you anticipate utilizing on the above named project.

- H. Have you ever failed to satisfactorily complete any work awarded to you? If so, note when, where and why?

I. Name of Bonding Company and name and address of agent.

Company _____

Agent _____

Address _____

Dated on this _____ day of _____, 2019

Name of
Organization: _____

By: _____

Title: _____

NORTH CAROLINA

_____ COUNTY

I, _____, a Notary Public for the said County and State, do hereby

certify that _____ personally appeared before
me this day and acknowledged the answers to the foregoing questions and all statements therein
contained are true and correct.

Witness my hand and official seal, this the _____ day of _____, 20____.

Notary Public

(SEAL)

My Commission Expires:

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**STATE OF NORTH CAROLINA
E-VERIFY AFFIDAVIT
COUNTY OF DAVIDSON – CITY OF THOMASVILLE**

NOW COMES Affiant, first being sworn, deposes and says as follows:

1. I have submitted a bid for contract or desire to enter into a contract with the City of Thomasville;

2. As part of my duties and responsibilities pursuant to said bid and/or contract, I attest that I am aware of and in compliance with the requirements of E-Verify, Article 2 of Chapter 64 of the North Carolina General Statutes, to include (mark which applies):

After hiring an employee to work in the United States I verify the work authorization of said employee through E-Verify and retain the record of the verification of work authorization while the employee is employed and for one year thereafter; or

I employ less than twenty-five (25) employees in the State of North Carolina.

3. As part of my duties and responsibilities pursuant to said bid and/or contract, I attest that to the best of my knowledge any subcontractors employed as a part of this bid and/or contract are in compliance with the requirements of E-Verify, Article 2 of Chapter 64 of the North Carolina General Statutes, to include (mark which applies):

After hiring an employee to work in the United States the subcontractor verifies the work authorization of said employee through E-Verify and retain the record of the verification of work authorization while the employee is employed and for one year thereafter; or

Employ less than twenty-five (25) employees in the State of North Carolina.

Specify subcontractor: _____

This the _____ day of _____, 20____.

Affiant

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

[OFFICIAL SEAL]

_____, Notary Public

My Commission Expires: _____

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NORTH CAROLINA
DEPARTMENT OF STATE TREASURER
STATE AND LOCAL GOVERNMENT FINANCE DIVISION
AND THE LOCAL GOVERNMENT COMMISSION

JANET COWELL
TREASURER

GREGORY C. GASKINS
DEPUTY TREASURER

Memorandum # 2016-10

TO: All Local Governments, Public Authorities and Their Independent Auditors
FROM: Sharon Edmundson, Director, Fiscal Management Section
SUBJECT: Iran Divestment Act Notice for Local Governments in North Carolina
DATE: February 17, 2016

The North Carolina Department of State Treasurer is providing this letter to Local Government Units to explain new contracting and procurement compliance obligations created by the [Iran Divestment Act of 2015](#) (N.C.G.S. 143C-6A-1 to 6A-9).^{*} Local Government Units should be aware that effective February 26, 2016, this law imposes new obligations on each new bid process, each new contract, and each renewal or assignment of an existing contract. The specific requirements are as follows:

- 1. Local Government Units must obtain a one-page mandatory certification under the Act.** *(See sample "Contract Certification" form below for details.)*
- 2. Local Government Units may not enter into contracts with any entity or individual found on the State Treasurer's Iran Final Divestment List.** This list will be posted on the Department of State Treasurer's website on February 26, 2016 and will be updated every 180 days. *(See "Contract Restrictions" below for details.)*

Background

The Iran Divestment Act's requirements applicable to Local Government Units^{**} will become effective on February 26, 2016, at the time the State Treasurer publishes the first list of prohibited companies and individuals (a "[Final Divestment List](#)") under the Act.

^{*} The Iran Divestment Act of 2015 can be found online at:

<http://www.ncleg.net/Sessions/2015/Bills/Senate/PDF/S455v5.pdf>

^{**} The Act's requirements use the term "State agency." G.S. 143C-6A-3(7) provides that in the act, the term "State agency" includes not only State departments, boards, and commissions, but also "any political subdivision of the State" such as a Local Government Unit.

Final Divestment List

The Department of State Treasurer develops the Final Divestment List using data from a research vendor, U.S. federal sanctions lists, and other credible information available to the public. It consists of any individual or company, including parent entities and majority owned subsidiaries, that:

- Provided goods or services of \$20,000,000 or more within any 12-month period in the energy sector of Iran during the preceding five years;
- Extended \$20,000,000 or more in credit, under certain circumstances, to another individual or company that will use the credit to provide goods or services in the energy sector in Iran. (G.S. 143C-6A-3(4).)

The Department of State Treasurer will update the Final Divestment List at least every 180 days. The list will be published on the State Treasurer's website at www.nctreasurer.com/Iran and periodically circulated to Local Government Units.

Requirement 1: Contract Certification

For new procurements and new, renewed, or assigned contracts on or after February 26, 2016, each Local Government Unit must obtain a simple certification from each bidder or vendor. The bidder or vendor must affirm that it is not listed on the State Treasurer's Final Divestment List found at www.nctreasurer.com/Iran as of the date of signature. The certification is due at the time a bid is submitted or the time a contract is entered into, renewed, or assigned. (G.S. 143C-6A-5(a).)

We have attached on the next page a short form that can be used for this certification, but Local Government Units are free to instead use their own form or put the required certification in the text of a contract or purchase order. Each Local Government Unit shall maintain its own records demonstrating these certifications.

Requirement 2: Restriction on Contracting

Individuals or companies on the Final Divestment List are ineligible to contract or subcontract with Local Government Units. (G.S. 143C-6A-6(a).) Any existing contracts with these Iran-linked persons will be allowed to expire in accordance with the contract's terms. (G.S. 143C-6A-6(c).)

Contracts valued at less than \$1,000.00 are exempt from this restriction. (G.S. 143C-6A-7(a).) In addition, a Local Government Unit may contract with a listed individual or company if it makes a good-faith determination that (1) the commodities or services are necessary to perform its functions and (2) that, absent such an exemption, it would be unable to obtain those commodities or services. (G.S. 143C-6A-7(c).) Local Government Units shall enter such exemptions into the procurement record.

Memorandum #2016-10
Iran Divestment Act
February 17, 2016
Page 3

The Act provides that vendors to Local Government Units may not utilize any subcontractor found on the State Treasurer's Final Divestment List. (N.C.G.S. 143C-6A-5(b).) It is each vendor's responsibility to monitor its compliance with this restriction.

Next Steps

The Department of State Treasurer anticipates distributing the first Final Divestment List on February 26, 2016. Once the List has been distributed, all Local Government Units should meet the contract certification requirements.

If you have questions about the Department of State Treasurer's Iran Divestment Policy, please contact Sharon Edmundson at Sharon.Edmundson@nctreasurer.com or 919-814-4289.

RFP Number (if applicable): _____

Name of Vendor or Bidder: _____

**IRAN DIVESTMENT ACT CERTIFICATION
REQUIRED BY N.C.G.S. 143C-6A-5(a)**

As of the date listed below, the vendor or bidder listed above is not listed on the Final Divestment List created by the State Treasurer pursuant to N.C.G.S. 143-6A-4.

The undersigned hereby certifies that he or she is authorized by the vendor or bidder listed above to make the foregoing statement.

Signature

Date

Printed Name

Title

Notes to persons signing this form:

N.C.G.S. 143C-6A-5(a) requires this certification for bids or contracts with the State of North Carolina, a North Carolina local government, or any other political subdivision of the State of North Carolina. The certification is required at the following times:

- When a bid is submitted
- When a contract is entered into (if the certification was not already made when the vendor made its bid)
- When a contract is renewed or assigned

N.C.G.S. 143C-6A-5(b) 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.

The State Treasurer's Final Divestment List can be found on the State Treasurer's website at the address www.nctreasurer.com/iran and will be updated every 180 days.

NC Division of Water Infrastructure MBE/WBE (DBE) Compliance Supplement Instructions

(This package combines the various aspects of State of NC HUB program requirements and Federal DBE requirements into a single compliance supplement in order to eliminate redundancy and ambiguity)

Item	What to do with it
Good Faith Efforts Form	Provided by all bidders to be responsive Only low bidder's form is submitted to the State
Table A (Summary of firms on job)	Provided by all bidders to be responsive Only low bidder's form is submitted to the State
Table B (per item being subbed)	Provided by low bidder if SRF project or SRP/SEL* that obtains less than 10% M/WBE utilization (see page 2)
Provide documentation of anything you did that is mentioned later in this supplement	- Proof of trade paper advertisement - Printouts of DBE sources used - Solicitation emails and/or letters
Additional Forms for SRF Projects (these forms are currently not applicable)	
6100-3 (per M/WBE firm)	Provided by low bidder if SRF project
6100-2	Distributed to M/WBE firms if SRF project
Subs submit concerns on 6100-2 forms to:	Michael Pigram Region 4, Atlanta Federal Center 61 Forsyth Street Atlanta, GA 30303-8960

NOTES on this Compliance Supplement

Verifiable Goals

- | | |
|---|-----------|
| EPA MBE/WBE participation goals: | MBE 10.9% |
| | WBE 10.4% |

These are goals that the State reports against and are not quotas. *The good faith efforts must be adhered to and all forms provided regardless of what percentage utilization is achieved.*

- | | |
|--|----------------|
| State of NC MBE/WBE participation goal: | 10% (combined) |
|--|----------------|

Table B is not required for SRP and SEL projects if you achieve 10% utilization.

DBE (MBE or WBE) Certification

In order for a firm to count towards the goals, a firm must be properly certified. Table A and Table B both provide spaces to note who certified the firm. The North Carolina Department of Administration and North Carolina Department of Transportation are the most common certifications we see listed. Division of Water Infrastructure staff verify all certifications listed.

For SRF projects, please note the EPA’s six Good Faith Efforts found in 40 CFR 33

Filling out the Good Faith Efforts Form and providing Table B (if subcontracting is achieved) constitutes compliance with EPA’s six good faith efforts.

- (1) Ensure MBE/WBEs are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities. For Indian Tribal, State and local Government recipients, this will include placing MBE/WBEs on solicitation lists and soliciting them whenever they are potential sources.
- (2) Make information of forthcoming opportunities available to MBE/WBEs and arrange time for contracts and establish delivery schedules, where requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process. This includes, whenever possible, posting solicitations for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.
- (3) Consider in the contracting process whether firms competing for large contracts could subcontract with MBE/WBEs. For Indian Tribal, State and local Government recipients, this will include dividing total requirements when economically feasible into smaller tasks or quantities in order to increase opportunities for participation by MBE/WBEs in the competitive process.
- (4) Encourage contracting with a consortium of MBE/WBEs when a contract is too large for one of these firms to handle individually.
- (5) Use the services and assistance of the SBA and the MBDA.
- (6) If the prime contractor awards subcontracts, require the prime contractor to take the steps in subparagraphs (1)-(5) of this section.

Pertinent State of North Carolina Administrative Code Regarding M/WBE Compliance. The provisions in this Compliance Supplement constitute compliance with the Rules below.

Owner Requirements	01 NCAC 30I .0306
Contractor Requirements	01 NCAC 30I .0308

Resources

Some sources for identifying MBE/WBE (DBE) firms

- <https://www.ips.state.nc.us/vendor/SearchVendor.aspx> (NCDOA)
- <https://www.ebs.nc.gov/VendorDirectory/default.html> (NCDOT)
- http://dsbs.sba.gov/dsbs/search/dsp_dsbs.cfm (US SBA)

Some sources for finding minority trade papers for potential solicitation advertisements and Federal advertising options

- <http://web.sba.gov/subnet/> (US SBA Subnet advertising website)
- <https://www.mbda.gov/> (US Dept. of Commerce)
- <https://ncadmin.nc.gov/businesses/hub> (NC HUB Office)

Good Faith Efforts Form

Attempts to provide subcontracting opportunities for MBE/WBE firms.

Per 01 NCAC 30I .0101, 50 points must be claimed below by the bidder.

(This is identical to State of NC Affidavit A)

- 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.

Results of Good Faith Efforts Undertaken (you must check one box below)

- No subcontractors are being used for this contracted work. Fill out Table A listing only the Prime Contractor. (This statement takes the place of State of NC Affidavit B)
- Subcontractors are being used. Fill out Table A and B for each trade. **Each Table B lists 3.**
- Subcontractors are being used. If any Table B has fewer than 3 solicitations you must also advertise in an M/WBE trade paper and indicate what source of M/WBE firms you used (*must list at least one*). Some possible papers and sources of M/WBE firms are listed in the Instructions of this Supplement.

Name of the Trade Paper: _____

Submit proof of advertisement with package

M/WBE Sources: Source: _____ Source: _____

Submit printouts from M/WBE source(s)

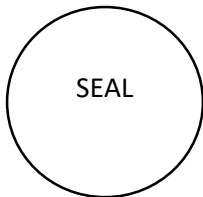
Certification Statement and Affidavit of Contractor.

The below affidavit constitutes compliance with 01NCAC 30I .0308(7)(a) and (b) and takes the place of State of North Carolina Affidavits C and D.

I have read the information in this compliance supplement and all information provided to the State in this package is accurate and true to the extent of my knowledge including the calculated percentages and the good faith efforts presented herein.

Prime Contractor Company Name (Print)

Prime Contractor Representative (Sign & Date)



State of _____, County of _____

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

Notary Public _____

My Commission Expires _____

Certification of Project Owner/Funding Applicant

Funding Applicant (City, Town etc)

Applicant Authorized Representative (Sign & Date)

Division of Water Infrastructure Project Number

Table A: Prime Contractor and list of selected subcontractors

List Prime and ALL of the selected subcontractors (both DBE's and non-DBE's) being used on the project. Each Trade listed on this sheet should have a completed Table B: Subcontract Solicitation List showing the DBE firms contacted and given opportunities to bid.

Company Name (list prime first then subs)	Company Address and Phone	Trade (Above) and Price (Below)	MBE or WBE and certifying agency <u>if applicable</u>	(State use only) Listed in EPLS as Debarred?
		\$		
		\$		
		\$		
		\$		

Calculate M/WBE utilization as a percent (00.00%) of the prime contract. Limited to 100% even if the Prime is a DBE.

MBE and WBE subs total	\$	_____ %
Prime Contract Price	\$	

Note: Table A substitutes for both the State of NC "Identification of Minority Participation" form and EPA Form 6100-4.

Table B: Subcontract Solicitation List

Table B is required if:

- 1) Project is Federally funded (**SRF**) OR;
- 2) Project is a State Reserve Project or State Emergency Loan (**SRP or SEL**) and Utilization % on Table A is less than 10%
- 3)

Trade: _____ (enter the trade being solicited, paving, hauling etc.)

List the firm being used on the project first. If three MBE or WBE firms are not listed, additional information must be provided showing advertisements and/or sources used to identify MBE/WBE subs.

Use as many of these sheets as are necessary to cover every trade being subbed out.

Company Name	Company Address and Phone	MBE or WBE and certifying agency if applicable.	How was this firm contacted (email, letter, phone) and what was the result of the solicitation?*

*Must submit copies of emails or letters. If phone calls were made this sheet can serve as documentation of calls.

MBE/WBE (DBE) – Change or Add a Subcontractor Form

According to EPA guidance on 40 CFR 33.302

If a DBE subcontractor fails to complete work under the subcontract for any reason, the recipient must require the prime contractor to employ the six good faith efforts described in §33.301 if soliciting a replacement subcontractor.

Please provide the information below **if the subcontracted work in question was included in previously submitted good faith efforts documentation:**

Prime Contractor:

Subcontracted work:

Previous Subcontractor:

Reason this firm did not complete the work:

New subcontractor and DBE status: MBE WBE N/A

If this is a new trade being subcontracted, or was not documented in the original Project Bid Information submittal to the State then good faith efforts to solicit a DBE firm must be documented. As the original DBE instructions indicate, please provide a Table B from those original instructions, showing all the DBE firms contacted to perform this work. If three (3) firms are not listed on Table B, then additionally you must submit proof of an advertisement in a minority trade paper and evidence that there were not three reasonably available firms in the work area. The EPA provides in 33.301(a) that good faith efforts are to be carried out "...to the fullest extent practicable...". If solicitations were not carried out due to being impracticable, please attach this explanation to this form.

Please follow the steps below for new subcontracted work:

Indicate the new trade being subcontracted:

Indicate the firm being used and DBE status: MBE WBE N/A

Attach Table B

(For State Use) Is this sub debarred? Yes No

Project Owner/Applicant:

Project Number:

Signature of Prime Contractor's Representative

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CONSTRUCTION CONTRACT

THIS AGREEMENT, made the ___ day of _____ in the year _____ by and between _____, the Party of the First Part, hereinafter called the CONTRACTOR, and the City of Thomasville, the Party of the Second Part, hereinafter called the OWNER.

WITNESSETH:

That for and in consideration of the payments and agreements to be made and performed by the OWNER, the CONTRACTOR at its own proper cost and expense and with skill and diligence, will construct and complete all work included in a Construction Contract for the construction of:

City of Thomasville – Nucor Sanitary Sewer Outfall
Contract Amount of _____

In accordance with Contract Documents, and in full compliance with this Agreement the CONTRACTOR agrees to receive the prices stated in the Proposal attached to be full compensation for furnishing all labor, materials and equipment necessary to execute all the work contemplated in this Construction Contract.

The work on the site is to be commenced when directed by the ENGINEER, and to be diligently prosecuted to completion within 180 calendar days.

It is agreed by and between both parties to this Construction Contract that the ENGINEER shall in all cases determine the quantity of the several kinds of work and materials which are to be paid for under this Construction Contract, and he shall determine all questions in relation to lines, levels and dimensions of the work and as to the interpretation of the plans and specifications. Payment shall be made in accordance with provisions as outlined in the Proposal.

The Contract Documents shall consist of the following:

- Table of Contents
- Bidding Requirements
- Contract Forms
- Conditions of Contracts
- Division 1 – General Requirements
- Division 2 – Site Work
- Specifications
- Drawings Entitled: City of Thomasville – Nucor Sanitary Sewer Outfall

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

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

OWNER:

CONTRACTOR:

By: _____

By: _____

Raleigh York, Jr.

Title: Mayor

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

Attest: _____

Attest: _____

Title: _____

Title: _____

Address for giving notices:

Address for giving notices:

City of Thomasville – Utilities Department

10 Salem Street

Thomasville, NC 27360

License No.: _____
(where applicable)

Seal

Seal (where applicable)

PERFORMANCE BOND

Date of Execution: _____

Name of Principal: _____
(Contractor)

Name of Surety: _____

Name of Contracting Body _____ City of Thomasville
_____ 10 Salem Street, Thomasville, NC 27360

Amount of Bond: _____

Project: _____ City of Thomasville
_____ Nucor Sanitary Sewer Outfall
_____ Sanitary Sewer Improvements

KNOW ALL MEN BY THESE PRESENTS, that we, the PRINCIPAL AND SURETY above named, are held and firmly bound unto the above named Contracting Body, hereinafter called the Contracting Body, in the penal sum of the amount stated above for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by the presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the principal entered into a certain contract with the Contracting Body, identified as shown above and hereto attached:

NOW THEREFORE, if the principal shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term of said contract and any extensions thereof that may be granted by the Contracting Body, with or without notice to the Surety, and during the life of any guaranty required under the contract, and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the Surety being waived, then, this obligation to be void; otherwise to remain in full force and virtue.

Whenever Contractor shall be, and declared by Contracting Body to be in default under the Contract, the Contracting Body having performed Contracting Body's obligations thereunder, the Surety may promptly remedy the default, or shall promptly

- 1) Complete the Contract in accordance with its terms and conditions, or
- 2) Obtain a bid or bids for completing the Contract in accordance with its terms and conditions, and upon determination by Surety of the lowest responsible bidder, or, if the Contracting Body elects, upon determination by the Contracting Body and the Surety jointly of the lowest responsible bidder, arrange for a contract between such bidder and Contracting Body, and make available as Work progresses (even though there should be a default or a succession of defaults under the contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the contract price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term "balance of the contract price", as used in this paragraph, shall mean the total amount payable by Contracting Body to Contractor under the Contract and any amendments thereto, less the amount properly paid by the Contracting Body to Contractor.

IN WITNESS WHEREOF, the above-bound parties have executed this instrument under their several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Executed in three (3) counterparts.

Witness:

Contractor: (Trade or Corporate Name)

(Proprietorship or Partnership)

By: _____

Attest: (Corporation)

Title: _____

(Owner, Partner, or Corp.
Pres. or Vice-Pres. only)

By: _____

(Corporate Seal)

Title: _____

(Corp. Sec. or
Asst. Sec. only)

(Surety Company)

Witness:

By: _____

Title: _____

(Attorney in Fact)

Countersigned:

(Surety Corporate Seal)

N. C. Licensed Resident Agent

Name and Address - Surety Agency

Surety Company Name and N. C.
Regional or Branch Office Address

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PAYMENT BOND

Date of Execution: _____

Name of Principal: _____
(Contractor)

Name of Surety: _____

Name of Contracting Body _____
City of Thomasville

_____ 10 Salem Street, Thomasville, NC 27360

Amount of Bond: _____

Project: _____
City of Thomasville

_____ Nucor Sanitary Sewer Outfall

_____ Sanitary Sewer Improvements

KNOW ALL MEN BY THESE PRESENTS, that we, the PRINCIPAL AND SURETY above named, are held and firmly bound unto the above named Contracting Body, hereinafter called the Contracting Body, in the penal sum of the amount stated above for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by the presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the principal entered into a certain contract with the Contracting Body, identified as shown above and hereto attached:

NOW THEREFORE, if the principal shall promptly make payment to all persons supplying labor and material in the prosecution of the work provided for in said contract, and any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the surety being hereby waived, then this obligation to be void; otherwise to remain in full force and virtue.

All persons supplying labor and material in the prosecution of the work, known as claimant, shall be defined as one having a direct contract with the Principal or with a Subcontractor of the Principal for labor, material, or both, used or reasonably required for use in the performance of the Contract, labor and material being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental of equipment directly applicable to the Contract.

The above named Principal and Surety hereby jointly and severally agree with the Contracting Body that every claimant as herein defined, who has not been paid in full before the expiration of a period of ninety (90) days after the date on which the last of such claimant's work or labor was done or performed, or

materials were furnished by such claimant, may sue on this bond for the use of such claimant, prosecute the suit to final judgment for such sum or sums as may be justly due claimant, and have execution thereon. The Contracting Body shall not be liable for the payment of any costs or expenses of any such suit.

No suit or action shall be commenced hereunder by any claimant:

- a) unless claimant, other than one having a direct contract with the Principal, shall have given written notice to any two of the following: The Principal, The Contracting Body, or the Surety above named, within ninety (90) days after such claimant did or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the Principal, Contracting Body or Surety, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the state in which the aforesaid project is located, save that such service need not be made by a public officer.
- b) After the expiration of one (1) year following the date on which Principal ceased Work on said Contract, it being understood, however, that if any limitation embodied in this bond prohibited by any law controlling the construction hereof such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.
- c) Other than in a state court of competent jurisdiction in and for the county or other political subdivision of the state in which the Project, or any part thereof, is situated, or in the United States District Court for the district in which the Project, or any part thereof, is situated, and not elsewhere.

The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of mechanics' liens which may be filed of record against said improvements, whether or not claim for the amount of such lien be presented under and against this bond.

IN WITNESS WHEREOF, the above-bounden parties have executed this instrument under their several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Executed in three (3) counterparts.

Witness:

Contractor: (Trade or Corporate Name)

(Proprietorship or Partnership)

By: _____

Attest: (Corporation)

Title: _____

(Owner, Partner, or Corp.
Pres. or Vice-Pres. only)

By: _____

(Corporate Seal)

Title: _____

(Corp. Sec. or
Asst. Sec. only)

(Surety Company)

Witness:

By: _____

Title: _____

(Attorney in Fact)

Countersigned:

(Surety Corporate Seal)

N. C. Licensed Resident Agent

Name and Address - Surety Agency

Surety Company Name and N. C.
Regional or Branch Office Address

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CERTIFICATE OF FINANCE OFFICER

Provisions for the payment of the moneys to fall due under this agreement has been made by appropriation duly made or by bonds or notes duly authorized, as required by the "Municipal Fiscal Control Act".

Finance Officer

Date

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CERTIFICATE OF OWNER'S ATTORNEY

I, the undersigned, _____, the duly authorized and acting

Legal representative of _____ City of Thomasville _____ do hereby certify as follows:

I have examined the foregoing contract and surety bonds and the manner of execution thereof, and I am of the opinion that each of the aforesaid agreements has been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representatives have full power and authority to execute said agreements on behalf of the respective parties named thereon; and that the foregoing agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with terms, conditions and provisions thereof.

City Attorney

Date: _____

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CERTIFICATE OF INSURANCE

(Attach to this sheet)

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NOTICE OF AWARD

TO: _____

PROJECT DESCRIPTION: City of Thomasville
Nucor Sanitary Sewer Outfall
AWCK Job No. 22087

Advertisement for Bids dated _____ and Instructions to Bidders.

You are hereby notified that your BID has been accepted for items in the amount of \$ _____

You are required by the Instructions to Bidders to execute the Agreement and furnish the required certificates of insurance within ten (10) Calendar days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish said COI within ten (10) days from the date of this Notice, said OWNER will be entitled to consider all your rights arising out of the OWNER'S acceptance of your BID as abandoned. The OWNER will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Dated this _____ day of _____ in the year of _____.

City of Thomasville
Owner
By _____
Michael Brandt
Title _____
City Manager

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO AWARD is hereby acknowledged by _____

This the _____ day of _____ In the year of _____.

By: _____

Title: _____

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NOTICE TO PROCEED

TO: _____ DATE: _____

PROJECT: City of Thomasville

Nucor Sanitary Sewer Outfall

Sanitary Sewer Improvements

You are hereby notified to commence WORK in accordance with the Agreement dated _____
on or before _____, and you are to complete WORK within
_____ 180 _____ consecutive calendar days thereafter. The date of completion of all WORK is

City of Thomasville
Owner _____
By _____
Michael Brandt
Title _____
City Manager

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED
is hereby acknowledged by _____

This the _____ 2024.

By: _____

Title: _____

Employer Identification
Number: _____

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by



Issued and Published Jointly by



Endorsed by



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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

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

regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer has declined to address. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. (“CERCLA”); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§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 lowest, qualified, responsible, and responsive Bidder to whom Owner (on the basis of Owner’s evaluation as herein provided) makes an award.
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 three 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.

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, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
- 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
- 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
- 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee:* When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.

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

13.02 Allowances

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

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

13.03 *Unit Price Work*

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

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

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

1. *Calendar Day*—Any day of the week or month, no days being excepted. No allowance will be made for inclement weather if the Contractor was able or would have been able to prosecute the principal units of work for a period of not less than seven (7) hours between 9:00 a.m. and 5:00 p.m.
2. *Working Day*—Any day not including Saturdays, Sundays, or any legal holidays, in which weather or other conditions not under the control of the Contractor, will permit construction of the principal units of the work for a period of not less than seven (7) hours between 9:00 a.m. and 5:00 p.m. See drawings for information regarding restricted work hours for work inside NCDOT Right-of-Ways.
3. *Plan Holder* – A business recorded by the Engineer as having received a set of Bidding Documents.

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF WORK

Delete Section 4.01 Commencement of Contract Times; Notice to Proceed in its entirety and replace with the following:

Bids will remain subject to acceptance for a period of 90 calendar days after the bid opening, but Owner may, in its sole discretion, release any Bid and return the bid security prior to that date. Owner is not obligated to accept the lowest Bid, or any Bid. Owner reserves the right to reject any or all Bids, including without limitation the right to reject any or all nonconforming, nonresponsive, unbalanced, or conditional Bids, and to reject the bid of any Bidder if Owner believes it would not be in the best interest of the Owner to make an award to that Bidder. Should Owner make an award within this period, after being notified of award, Contractor will have 14 calendar days to return signed Contracts, with proper Bonds, Insurance Certificates, etc. Should Contractor fail to return properly executed Contract Documents, within 14 calendar days, the Owner may disqualify that Contractor and enter into contracts with the next highest Bidder.

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

Add the following new paragraph 5.02.E:

Contractor shall not use Owner's property except in performing the work as specified in this Contract.

Revise paragraph 5.03.A. 2 and 3 to read as follows: Owner is unaware of any drawings at or adjacent to the Site, or additional technical data.

Delete Section 5.06 Hazardous Environmental Conditions at Site in its entirety and replace with the following:

- A. No reports or drawings related to Hazardous Environmental Conditions at the Site are known to Owner.
- B. Not Used.

ARTICLE 6 – BONDS AND INSURANCE

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

- K. The limits of liability for the insurance required by Paragraph 6.03 of the General Conditions shall provide coverage for not less than the amounts included in the Instructions to Bidders.

ARTICLE 7 – CONTRACTOR’S RESPONSIBILITIES

Add the following new paragraph immediate after paragraph 7.04.C:

1. Consideration for materials and equipment to be considered “or equal” will be only given to materials and equipment received a minimum of 15 days prior to the bid date.

Add the following new paragraph immediate after paragraph 7.05.B:

Consideration for materials and equipment to be considered “substitute” will be only given to materials and equipment received a minimum of 15 days prior to the bid date.

Delete Section 7.09 Taxes in its entirety and replace with the following:

CONTRACTOR shall include in his bid all costs for all sales and use tax applicable to the project. CONTRACTOR shall submit to the OWNER an itemized list of the quantity and value of materials and rentals used on the project and the amount of sales and use tax paid on such materials and rentals. Itemized list shall be submitted monthly to the ENGINEER. ENGINEER will not authorize monthly pay requests to CONTRACTOR until sales and use tax report has been submitted to the ENGINEER.

ARTICLE 9 – OWNER’S RESPONSIBILITIES

Revise paragraph 9.04.A to read as follows:

Owner shall make payments to Contractor net thirty (30) days upon receiving the Application for Payment from the Engineer as provided in the Agreement.

ARTICLE 10 – ENGINEER’S STATUS DURING CONSTRUCTION

Add the following immediately after Paragraph 10.03.A:

- B. The Resident Project Representative (RPR) 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.
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 13 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

Delete Paragraph 13.03.E in its entirety and replace with the following:

Owner reserves the right to increase or decrease the estimated quantities in the contract as necessary to complete the project. Such changes in quantities from the estimated quantity shall not invalidate the contract nor release the surety, and the Contractor agrees to perform the work at the unit prices established in the contract. Overruns and underruns of estimated quantities shall not constitute a basis for any claims under this contract.

Add the following new paragraph 13.03.F:

Owner reserves the right to eliminate any item from the contract and such action will in no way invalidate the Contract. Payment will be made for the remaining items in the contract at the unit price established in the Contract. The elimination of any items from the contract shall not constitute a basis for any claims under this contract.

Add the following new paragraph 13.03.G:

Contract to be awarded for the proposed work may be extended fifty (50%) of the contract price without consent or permission of the Contractor, and an additional fifty (50%) with the consent of the Contractor. Total extensions not to exceed one hundred (100%) percent of the contract price.

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

Delete Paragraph 15.01.B.3 in its entirety and replace with the following:

An amount equal to 5% of the total amount due on the progress estimate will be deducted and retained by the Owner until completion of the contract.

Revise Paragraph 15.01.D to read as follows: Net thirty (30) 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.

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

Delete Section 16.04 in its entirety.

ARTICLE 17 – DISPUTE RESOLUTION

Delete Article 17 in its entirety.

ARTICLE 18 – MISCELLANEOUS

Add the following new Section 18.09 Liquidated Damages:

The date of beginning and the time of completion of the WORK are ESSENTIAL CONDITIONS of the CONTRACT DOCUMENTS and the WORK embraced shall be commenced on the available date specified in the Supplemental General Conditions.

The Contractor will proceed with the work at such rate of progress to insure full completion within the contract time. It is expressly understood and agreed, by and between the Contractor and the Owner, that the contract time for the completion of the work described herein is a reasonable time, taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the work.

If the Contractor shall fail to complete the work within the contract time or extension of time granted by the Owner, then the Contractor will pay the Owner the amount of liquidated damages as specified in the Bid Form for each calendar day that the Contractor shall be in default after the time stipulated in the contract documents.

The Contractor shall not be charged with liquidated damages or any excess cost when the delay in completion of the work is due to the following, and the Contractor has promptly given WRITTEN NOTICE of such delay to the Owner or Engineer.

- a. To any preference, priority or allocation order duly issued by the Owner.
- b. To unforeseeable causes beyond the control and without the fault or negligence of the Contractor, including but not restricted to, acts of God, or of the public enemy, act of the Owner, acts of another contractor in the performance of a contract with the Owner, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and abnormal and unforeseeable weather; and
- c. To any delays of subcontractors occasioned by any of the causes specified in paragraphs (a) and (b) of this article.

PROVIDED FURTHER, that the Contractor shall, within ten (10) days from the beginning of such delay, unless the Owner shall grant a further period of time prior to the date of final settlement of the contract, notify the Owner, in writing, of the cause of the delay, who shall ascertain the facts and extent of the delay and notify the Contractor within a reasonable time of its decision in the matter.

It is further agreed that, if default is made in completion, the Owner shall deduct as liquidated damages, the sum of two-thousand and five-hundred dollars (\$2,500.00) per day for each and every calendar day completion is delayed in excess of the contract time set forth in the Bid Form. This amount is agreed upon as reasonable due to the effect of each section of the work on the time of completion of the entire project.

END OF SECTION

SECTION 01015
PROJECT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of these Contracts, including General and Supplementary Conditions and other Division 1-16 Specification Sections, apply to this Section.

1.2 WORK SEQUENCE

- A. Within ten (10) days of the receipt of Notice to Proceed, the Contractor shall submit a complete construction schedule to the Engineer for review and approval. Schedule shall be in the form of a Gantt Chart (bar chart) and shall indicate the order in which work is to be performed. The sequence and interdependence of all major activities must be shown.
- B. Schedule shall be drawn to a calendar time scale. Commencement and completion dates for each activity shall be shown, as well as the duration in calendar days for each activity. Schedule shall show not only actual construction activities, but activities such as submittal and review of shop drawings.
- C. Contractor shall update the construction schedule monthly to reflect the progress of work. Updated schedules shall be submitted to the Engineer for review and approval. Monthly partial payments will be dependent upon submission of an updated construction schedule deemed satisfactory by the Engineer.

1.3 WORKING HOURS

- A. In areas outside of the NCDOT right-of-way, contractor shall perform work only between the hours of 8:00 a.m. and 6:00 p.m. Monday through Friday and 9:00 a.m. and 5:00 p.m. on Saturday.
- B. In areas within the NCDOT right-of-way, contractor shall perform work only between the hours of 9:00 a.m. and 4:00 p.m. Monday through Friday. No work shall be allowed on Saturday or Sunday.

1.4 CONSTRUCTION STAKEOUT

- A. On behalf of Owner, Engineer will provide construction stakeout for proposed water improvements as shown on the drawings. Two offset stakes will be provided for all valve and hydrant locations to provide horizontal and vertical control.
- B. Contractor will be responsible for scheduling Engineer to have improvements staked. A 48-hour minimum notice to Engineer will be required.
- C. Additional staking and/or restaking will be paid for by the Contractor at the Engineer's current Hourly Rates.

1.5 PERMITS, EASEMENTS AND RIGHTS-OF-WAY

- A. The easements (temporary or permanent) and rights-of-way for the pipelines will be provided by Owner. Contractor shall confine his construction operations within the limits indicated on the drawings. Contractor shall use due care in placing construction tools, equipment, excavated materials, and pipeline materials and supplies in order to avoid damage to property and interference with traffic.
- B. Bidders are advised that permits and/or easements not obtained by Owner prior to award of contract will be obtained by the Power of Eminent Domain and will be available within 120 days from date of issuance of Notice of Award. Bidders shall not seek any compensation from Owner as a result of Owner not having all permits and/or easements within 120 days from issuance date of Notice of Award.
- C. Easements (temporary or permanent) across private property are indicated on the drawings. Contractor shall set stakes to mark the boundaries of construction easements across private property. Contractor shall furnish, without charge, competent persons from his force and such tools, stakes, and other materials as may be required to stake out the boundaries of construction easements. The stakes shall be protected and maintained until completion of construction and cleanup.
- D. Contractor shall not enter any private property outside the designated construction easement boundaries without written permission from the owner of the property. Contractor shall provide one (1) copy of such written permission to the Owner and Engineer.

1.6 OPERATION OF EXISTING FACILITIES

- A. Contractor shall provide temporary facilities and make temporary modifications as necessary to keep the existing facilities in operation during the construction period.
- B. Prior to connecting to the existing water and sewer system, Contractor shall coordinate with and Engineer.

1.7 LOCATION OF EXISTING UTILITIES

- A. Prior to beginning work, Contractor shall notify all existing utility companies and have all existing utilities located.
- B. All utility conflicts shall be brought to the attention of the Engineer immediately. Engineer will promptly review utility conflicts and advise Contractor as to how to proceed.

1.8 NOTICES TO OWNERS AND AUTHORITIES

- A. Contractor shall, as provided in General Conditions, notify Owners of adjacent property and utilities when prosecution of the work may affect them.
- B. When it is necessary to temporarily deny access to property, or when any utility service connection must be interrupted, Contractor shall give notice sufficiently in advance to enable the affected persons to provide for their needs. Notices will conform to any applicable local ordinance and, whether delivered orally or in writing, will include appropriate information concerning the interruption and instructions on how to limit inconvenience caused thereby.

- C. Utilities and other concerned agencies shall be contacted at least 48 hours prior to cutting or closing streets or other traffic areas or excavating near underground utilities or pole lines.

1.9 LINES AND GRADES

- A. All work shall be done to the lines, grades and elevations shown on the construction drawings.
- B. Owner will periodically check the lines and grades for compliance with the construction drawings. Any discrepancy will be brought to the attention of the Owner, Engineer and Contractor immediately and will be resolved prior to proceeding with additional construction. This check does not relieve Contractor from providing his own quality control.

1.10 UNFAVORABLE CONSTRUCTION CONDITIONS

- A. During unfavorable weather, wet ground, or other unsuitable construction conditions, Contractor shall confine his operations to work, which will not be affected adversely by such conditions. No portion of the work shall be constructed under conditions, which would adversely affect the quality or efficiency thereof, unless special means or precautions are taken by Contractor to perform the work in a proper and satisfactory manner. No additional cost will be made for such special means taken by the Contractor.
- B. Contractor shall review local weather forecasts and take necessary precautions to remove or relocate equipment, materials, supplies, etc. when precipitation is predicted which may result in the inundation of the work area. Contractor will not make a claim against the Owner or Engineer in the event a rainfall event or events occur and the Contractor's equipment, materials, supplies temporary work areas or completed work are damaged or lost due to flooding or other disaster. It is the Contractor's responsibility to repair or replace any lost or damaged item resulting from such flooding or such other disaster.

1.11 CLEAN-UP

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

1.12 REFERENCE STANDARDS

- A. Reference to standards, specifications, manuals or codes of any technical society, organization, or association, or to the laws regulations of any governmental authority, whether such reference be specified or by implication, shall mean the latest standard specification, manual, code or laws or regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated. However, no provision of

any referenced standard, specifications, manual, or code (whether or not specifically incorporated by reference in the Contract Documents) shall be effective to change the duties and responsibilities of Owner, Contractor, Engineer, or any of their Consultants, agents, or employees from those set forth in the Contract Documents, nor shall it be effective to assign to Engineer, or any of Engineer's Consultants, agents, or employees, any duty or authority to supervise or direct the furnishing of performance of the work.

1.13 PRECONSTRUCTION CONFERENCE

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

1.14 PROGRESS MEETINGS

- A. Contractor shall schedule and hold regular progress meetings at least monthly and at other times as requested by Engineer or required by progress of the Work. Contractor, Engineer, and all Subcontractors active on the site shall be represented at each meeting. Contractor may at his discretion request attendance by representatives of his Suppliers, manufacturers, and other subcontractors.

- B. Meeting minutes will be prepared and distributed by the Engineer. The purpose of the meetings will be to review the progress of the work, maintain coordination of efforts, discuss changes in scheduling, and resolve other problems, which may develop.

1.15 CONTINGENCY ALLOWANCES

- A. Use the contingency allowance only as directed for the Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.
- B. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.
- C. At Project closeout, credit unused amounts remaining in the contingency allowance to the Owner by Change Order.

1.16 TESTING AND INSPECTION

- A. The Owner will be responsible for providing personnel to verify test results performed by the Contractor.
- B. The Contractor shall test all work as specified in the Contract Documents, including geotechnical. Contractor shall pay all testing services, including retesting fees for failed tests.
- C. The Contractor shall furnish all apparatus and personnel required to conduct the testing and pay for all costs connected therewith.

1.17 SITE ADMINISTRATION

- A. Contractor shall be responsible for all areas of the site used by him and all Subcontractors in the performance of the work. Contractor will exert full control over the actions of all employees and other persons with respect to the use and preservation of property and existing facilities, except such controls as may be specifically reserved to Owner or others. Contractor has the right to exclude from the site all persons who have no purpose related to the work or its inspection.

1.18 OSHA'S REVISED STANDARD FOR EXCAVATION

- A. Contractor shall be responsible for complying with OSHA'S revised standard for excavation, as amended. See sheets OSHA-1 and OSHA-2 at end of this section.

1.19 STORMWATER INSPECTIONS

- A. Contractor shall inspect all erosion control measures on a weekly basis and within 24 hours of a 1.0-inch rainfall event (within a 24-hour period) and complete the STORMWATER INSPECTIONS FOR GENERAL PERMIT NCG010000 –LAND DISTURBING ACTIVITIES (Form attached at end of Section).
 - 1. Contractor shall maintain a file of said report and submit copies of report to Owner and Engineer on a monthly basis.
- B. Any repairs or required maintenance on erosion control measures noted during inspection are to be made prior to continuing with any construction activities.

END OF SECTION 01015

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**INSPECTION AND MONITORING RECORDS FOR ACTIVITIES UNDER STORMWATER GENERAL PERMIT NCG010000
AND SELF-INSPECTION RECORDS FOR LAND DISTURBING ACTIVITIES PER G.S. 113A-54.1**

Project Name	City of Thomasville – Nucor Sanitary Sewer Outfall		Land Quality or Local Program Project/Permit #	
Approving Authority		Date of Plan Approval	Expiration Date, if applicable	
NCG010000 Certificate of Coverage Number			Date of COC Issuance	
Coverage under the NCG010000 permit must be renewed annually, if issued after April 1, 2019 until Notice of Termination is filed and approved.				

PART 1A: Rainfall Data

	Rain Amount (inches) Daily Rainfall Required. If no rain, indicate with a "zero"
M	
T	
W	
Th	
F	
Sat (Inspection Optional)	
Sun (Inspection Optional)	

PART 1B: Phase(s) of the Plan

Check ALL applicable box(es) that apply to completed & current phases	X
Initial installation of erosion and sediment control measures	
Clearing and grubbing of existing ground cover	
Completion of any grading that requires ground cover	
Completion of all land-disturbing activity, construction or development	
Permanent ground cover sufficient to restrain erosion has been established	

Are there any site or project conditions that limit completion of inspection? If yes, explain conditions and areas of site that were inaccessible.	
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PART 2: STORMWATER PLANS AND CONTROLS: For each question below, mark the corresponding box as Yes, No or N/A. For all items marked “No”, note in Part 3A the Reference letter and provide the Corrective Action and location of the deficiency, the original date noted, and the date it was noted as being corrected. NOTE: Reference letters may be used multiple times.

Reference	Part 2A: Storm Water Plans and Related Documents	Yes	No	N/A
A	Is the approval letter or certificate, COC and a copy of the NPDES Construction General Permit (CGP) on site? (Readily available electronic copy of CGP is acceptable)			
B	Is the approved plan on site and current?			
Reference	Part 2B: Stormwater Pollutant Controls	Yes	No	N/A
C	Are erosion and sediment controls that are shown on the approved plan installed and operating properly with no repairs needed?			
D	Are stormwater controls that are shown on the approved plan installed and operating properly with no repairs needed?			
E	Vehicle Tracking: Are construction entrances operating properly with no repairs needed?			
F	Soil Stabilization: Are areas of the site where construction activities have ceased been properly stabilized within the required timeframes?			
G	Are earthen stockpiles stabilized or otherwise protected from sediment loss, and located at least 50 feet away or downhill from drain inlets and surface waters?			
Reference	Part 2C: Non-Storm Water Pollutant Controls	Yes	No	N/A
H	Concrete, stucco, paint, etc. washouts: Are washouts installed, properly located, posted and operating with no repairs needed?			
I	Solid & hazardous wastes: Are trash, debris, and hazardous materials properly managed?			
J	Sanitary waste: Are portable toilets properly located and operating with no visible repairs needed?			
K	Equipment and stored fluids: Are fuels, lubricants, hydraulic fluids, etc. contained so as not to enter surface and ground waters?			
Report oil spills and the release of hazardous substances to the appropriate DEQ Regional Office via phone call or email within 24 hours of discovery. https://deq.nc.gov/contact/regional-offices				

For any items listed in the section below, a full description of sedimentation is required in Part 3A. This includes, but may not be limited to: location, estimated amount of sediment that has left the site and/or entered waters, apparent causes of the sediment loss, and what corrective actions need to be taken to prevent this from recurring.

Reference	Part 2D: Sedimentation	Yes	No	N/A
L	Are sediment or other pollutants noted beyond the approved or permitted limits of disturbance?			
M	Are BMPs detected as releasing sediment or other pollutants into receiving waters?			
Report visible sedimentation into streams or wetlands to the appropriate DEQ Regional Office via phone call or email within 24 hours of discovery. https://deq.nc.gov/contact/regional-offices				

PART 3C: GROUND STABILIZATION: Must be recorded, at a minimum, after each phase. *Add rows as needed.*

Site area description and location where construction activities have temporarily or permanently ceased	Time Limit for Ground Cover (see table below)	Have stabilization measures been installed? (Y/N)	Temporary or Permanent Stabilization (T/P)	Is Ground Cover Sufficient to Restrain Erosion? (Y/N)	Original Inspection Date	Describe Actions Needed <u>Corrective actions should be performed as soon as possible and before the next storm event</u>	Date Previous Action(s) Observed as Corrected

GROUND STABILIZATION TIMEFRAMES

Site Area Description	Stabilization	Timeframe Variations
Perimeter dikes, swales and slopes	7 Days	None
High Quality Water (HWQ) Zones	7 Days	None
Slopes Steeper than 3:1	7 Days	7 days for perimeter dikes, swales, slopes and HWQ zones 14 days for slopes 10 ft or less in length and not steeper than 2:1 10 days for Falls Lake Watershed
Slopes 3:1 to 4:1	14 Days	7 days for perimeter dikes, swales, slopes and HWQ zones 7 days for slopes greater than 50 ft in length 10 days for Falls Lake Watershed
All other areas with slopes flatter than 4:1	14 Days	7 days for perimeter dikes, swales, slopes and HWQ zones 10 days for Falls Lake Watershed

PART 3D: NEW OR REVISED MEASURES: Erosion and sedimentation control measures omitted or installed, at a minimum since the last inspection, shall be documented here or by initialing and dating each measure or practice shown on a copy of the approved erosion and sedimentation control plan. Alterations and relocations of measures shall also be documented if they significantly deviate from the approved plan. The removal of measures should also be documented. List dimensions of measures such as Sediment Basins and Dissipator Pads. Add rows as needed. Corrective actions should be included in Part 3A.

Measure ID or Location and Description	Proposed Dimensions (ft.)	Actual Dimensions (ft.)	Significant Deviation* from Plan? (Y/N)	Date measure observed as installed, altered, relocated or removed	Installed (I) Altered (A) Relocated (R) Removed (X)

*Significant deviation means any omission, alteration or relocation of an erosion or sedimentation control measure that prevents it from performing as intended.

PART 4: Signature of Inspector

Financially Responsible Party (FRP) / Permittee				County	
INSPECTOR		Name	Employer		
Inspector Type (Mark)	<input checked="" type="checkbox"/>	Address			
FRP/Permittee	<input type="checkbox"/>				
Agent/Designee	<input type="checkbox"/>	Phone Number	Email Address		
By this signature, I certify in accordance with the NCG010000 permit & G.S. 113A-54.1 that this report is accurate and complete to the best of my knowledge.					
Financially Responsible Party / Permittee or Agent / Designee			Date & Time of Inspection		

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NOTE: The registered Professional Engineer referred to in this document is the RPE secured by the Contractor and not the design RPE for this water or sewer project.

FACT SHEET: OSHA'S REVISED STANDARD FOR EXCAVATIONS
29 CFR PART 1926 OCTOBER 31, 1989

I. SCOPE

Covers all open excavations; defines excavation to include trenches.

II. GENERAL REQUIREMENTS

Protection of employees in excavations against cave-ins except when the excavation is in stable rock or less than five feet deep and examination by a competent person provides no evidence that a cave-in should be expected; and against falling rock, soil or material by use of an 'adequate' system. -The latter operation includes scaling to remove loose rock or soil, installation of protective barricades and other 'equivalent protection. Material or equipment which might fall or roll into an excavation must be kept at least two feet from the edge of excavations, or have retaining devices, or be prevented from falling with a combination of both precautions.

Daily inspections of excavations, adjacent areas, and protective systems by a competent person and the removal of exposed employees if-evidence –of possible cave-ins, failure of protective systems, hazardous atmospheres, or other hazardous conditions until necessary precautions have been taken.

Removal of, or neutralization of surface encumbrances which may create a hazard.

Estimate location of underground installations (sewer, telephone, electrical, fuel and other lines; storage tanks, etc.) prior to digging; pinpoint actual locations as estimated locations are approached.

Ramps, runways, ladders or stairs as means of access/egress must be within 25 feet of an employee work area if a trench is four feet or more deep.

Warning system for mobile equipment including barricades, hand or mechanical signals, or stop logs.

Testing and Controls for hazardous atmospheres including emergency rescue equipment and daily inspections for potentially hazardous conditions by a 'competent person'. Controls include respirators or additional ventilation, if needed, and individually attended lifelines during descent into bell-bottom pier holes or similar excavations.

-Support systems such as shoring & bracing or underpinning to ensure the stability of adjacent structures such as buildings, walls or sidewalks.

III. REQUIREMENTS FOR PROTECTIVE SYSTEMS

Sloping and benching systems - four options:

1. A slope of 34 degrees or less, in lieu of soil classification. A slope of this gradation or less is considered safe for any type of soil.
2. Maximum allowable slopes and allowable configurations for sloping and benching systems will be determined through use of Appendices A (Soil Classification) and B (Sloping and Benching).
3. Designs of sloping or benching shall be selected from and be in accordance with data provided in written form, the text to identify: Criteria that affect the selection, the limits of use of the data and

sufficient explanatory data as necessary to assist in making a correct choice of a protective system.

4. At least one copy of the tabulated data identifying the Registered Professional Engineer who approved the information shall be maintained at the job site during the time the work is being carried out.
5. Excavations can be designed by a Registered Professional Engineer, put in written form and kept at the work site, but must include, at least, the magnitude and configuration of the slopes determined to be safe for the project and the name of the RPE who approved the plan.

Support, shield and other protective systems - four options:

1. Designs for timber shoring in trenches set in accordance with the conditions and requirements determined by using Appendices A and C (timber shoring for trenches). For aluminum hydraulic shoring Appendices A and D can be used if manufacturer's tabulated data is not available.
2. Designs using manufacturer's tabulated data may be used, deviation allowed only with specific, written approval of the manufacturer.
3. Designs using other tabulated data may be used provided the data is in writing and includes: Explanatory information to aid the user in making a selection, the criteria determining the selection, and the limits on the use of the data. At least one copy of the information, including the identity of the RPE, kept at the work Site during construction of the protective system.
4. Design by a Registered Professional Engineer. Design systems not using any of the three previously cited options must be approved by a RPE, shall be in writing and include the identity of the RPE and details such as sizes, types and configurations of the materials to be used. At least one copy of the plan is to be at the job site during construction.

The standard allows an employer to use a trench box or shield that is either designed or approved by a registered professional engineer (RPE), or is based on tabulated data prepared or approved by an RPE. The standard allows construction workers to remain inside trench shields that are being repositioned, provided that the shields are moved horizontally only and the shields are not lifted.

According to the new standard, information necessary for the safe installation, placement, use and removal of any trench support system must be available at the work site at all times, but a written log or record of inspections is not necessary.

This final standard goes into effect 60 days after publication in the Federal Register.

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Divisions 1 and 2 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies the measurement and payment of the contract unit prices for the project.
- B. Related Sections include the following:
 - 1. "Bid Form" for unit price quantities and bid amounts.
 - 2. Division 1 Section "Application for Payment".
 - 3. Division 2 – all Sections.

1.3 GENERAL

- A. The bid items shown in the Bid Form have been created solely for the purpose of comparison of bids and for use in the preparation of monthly Applications for Payment. Quantities shown thereon must be considered as approximate only.
- B. Basis for payment and unit of measurement for the work under this contract shall be in accordance with the following and shall include furnishing all labor, tools, equipment and materials required to construct the improvements in the manner specified including but not limited to all types of excavation, trenching, shoring, pumping, pipe installation, testing, backfilling, repairs, surface restoration and all other items necessary to complete the work as specified.
- C. All work shown on the plans herein specified or implied in any way on the drawings or specifications shall be done regardless of whether or not the work is specifically defined in any bid item.
- D. The non-utilization or partial utilization of any bid item shall not serve as a claim for any contract or unit price adjustment as the Contractor shall be paid the unit price bid for the number of units actually incorporated and accepted into the work.
- E. Payment and measurement will be based on this Section.
- F. Payment for lump sum items will be paid based on a percent complete basis determined by the Engineer.

1.4 PAY ITEMS

A. Bid Item #1 – Mobilization

1. Payment for Mobilization will be paid for at the contract lump sum price for “Mobilization”. No additional payment will be made for insurance or additional items associated with project start-up, etc. since the work is considered to be included in the lump sum bid for Mobilization.
2. Partial payments for the item of “Mobilization” will be made with the first and second Application for Payments paid on the contract, and will be made at the rate of 50% of the lump sum price for “Mobilization” on each of these Application for Payments, provided the amount bid does not exceed 5% of the total amount bid for the project. Where the amount bid for “Mobilization” exceeds 5% of the total bid, 2-1/2% of the total amount bid will be paid on each of the first two Applications for Payment, and that portion exceeding 5% will be paid on the final Application for Payment.

B. Bid Item #2 – Clearing and Grubbing

1. Payment for clearing and grubbing will be paid for at the contract lump sum for “Clearing and Grubbing and Debris Removal” and will be full compensation for all work described in the contract documents.
2. Partial payments will be made based on percentage of work completed to date as determined by the Engineer.

C. Bid Item #3 – Erosion Control

1. Payment for installation and maintenance of all erosion control measures will be paid for at the contract lump sum for “Erosion Control” and will be full compensation for all work described in the contract documents.
2. The price bid shall include temporary culverts required for the installation of construction entrances, as shown in the contract documents. No additional payment will be made for removal of temporary culverts and restoration of the area after area is no longer being used for access since the work is considered incidental.
3. Partial payments will be made based on percentage of work completed to date as determined by the Engineer.

D. Bid Item #4 – Seeding and Mulching

1. Payment for seeding and mulching will be paid for at the contract lump sum price for “Seeding and Mulching”. No additional payment will be made for seedbed preparation, seed, fertilizer, lime, or repair seeding to completely restore disturbed areas to preconstruction condition or better, since the work is considered incidental to the work and is to be included in the contract lump sum price.

E. Bid Item #5 – Stabilization Stone

1. Stabilization Stone is defined, as stone installed for pipe installation where in the opinion of the Engineer, the soil is unsuitable and ordered removed.
2. Payment will be based on the actual number of tons based on quarry tickets. Quarry tickets shall be given to Resident Project Representative at time of delivery and pay item will be marked on ticket. Tickets not given to Resident Project Representative will not be paid for. Stone wasted or not used in the opinion of the Resident Project Representative shall be deducted from the quarry tickets.

3. No additional payment will be made to undercut the proposed sewer main or to dispose of the unsuitable materials since the work is considered incidental to the work and is to be included in the unit price bid.
4. Payment for installation of stabilization stone will be paid for at the contract unit price per ton for “Stabilization Stone” incorporated and accepted into the work and will be full compensation for all work described in the contract documents.

F. Bid Item #6 – Incidental Stone

1. Incidental stone is defined as stone used for temporary or permanent driveway replacement stone, used in parking lots/areas, roadway shoulder, temporary replacement of roadway pavement or as otherwise directed by the Resident Project Representative. No direct payment will be made for stone screenings used on roadways. Stone will be ABC stone, #57, or other type stone as needed or directed. Stone replaced on unpaved areas or graveled areas will generally need to be the same type of stone as existing type.
2. Payment will be based on the actual number of tons based on quarry tickets. Quarry tickets shall be given to inspector at time of delivery and pay item will be marked on ticket. Tickets not given to Resident Project Representative will not be paid for. Stone wasted or not used in the opinion of the Resident Project Representative shall be deducted from the quarry tickets.
3. No additional payment will be made to backfill, compact stone, etc. in NCDOT roadway and driveways or to dispose of the excavated materials since the work is considered incidental to the work and is to be included in the unit price bid. No direct payment will be made for screenings used on the roadway to keep soil or other matter off the pavement.
4. Payment for installation of incidental stone will be paid for at the contract unit price per ton for “Incidental Stone” incorporated and accepted into the work and will be full compensation for all work described in the contract documents.

G. Bid Item #7 to #13 – 24” PS46 or PS115 PVC Sanitary Sewer Main

1. Payment for sanitary sewer mains will be based on the actual number of linear feet incorporated and accepted into the work and measured to the nearest 0.1 foot. The length through the manhole (inside diameter) will be excluded from the centerline length.
2. Sanitary sewer main depths will be measured from the existing centerline grade to the invert of the sanitary sewer main.
3. No additional payment will be made for excavation (excluding rock excavation), backfilling of trench and testing of the sanitary sewer main since the work is considered incidental and is to be included in the unit price bid.
4. No additional payment will be made for stone used to bed the pipe in accordance with the details shown on the plans since the work is considered incidental and is to be included in the unit price bid.
5. No additional payment will be made for installation of trace wire and terminations in accordance with the details shown on the plans since the work is considered incidental and is to be included in the unit price bid.
6. No additional payment will be made for removal and repair of chainlink fence, removal and repair of electric fence, and protection and/or removal and replacement of storm drain since the work is considered incidental and is to be included in the unit price bid.
7. Payment for sanitary sewer mains will be made at the contract unit price per linear foot for the various line items established in the Bid Form incorporated and accepted into the work and will be full compensation for all work described in the contract documents.

H. Bid Item #14 to #15 and Bid Item #17 to #19 – Bore and Jack Road/Railroad Crossings

1. Payment for various Bore and Jack Road/Railroad Crossings will be paid for at the lump sum unit price for “_____ Road/Railroad Crossing” and will be full compensation for all work described in the contract documents.
2. The price bid shall include 24” restrained joint ductile iron pipe installed inside 36” steel casing pipe, complete with support spiders as detailed in the construction documents.
3. The price bid shall include installation of 24” restrained joint ductile iron pipe as shown on the construction documents, up to its transition back to PVC or to the nearest manhole, including the transition couplings required to connect DIP to PVC.
4. No additional payment will be made for excavation of bore pits and receiving pits, pavement demolition required for pit installation, connection to existing and/or proposed waterlines, and backfilling as the work is considered incidental to the work and is to be included in the unit price bid.
5. No additional payment will be made for dewatering which may be required, as the work is considered incidental to the work and is to be included in the price bid.
6. All ductile iron pipe material for the Bore and Jack Road/Railroad Crossings has been pre-purchased by the City of Thomasville, to be delivered to the Nucor Facility. The price bid shall include costs for receiving and unloading material. Steel casing materials will not be pre-purchased and should be included in the price bid.
7. Payment for Bore and Jack Road/Railroad Crossings will be made at the contract price for each crossing incorporated and accepted into the work and will be full compensation for all work described in the contract documents.

I. Bid Item #16 – Storm Drain Crossing

1. Payment for storm drain crossings requiring a concrete saddle/flowable fill will be paid for at the lump sum unit price for “Storm Drain Crossing” and will be full compensation for all work described in the contract documents.
2. The price bid shall include 24” restrained joint ductile iron pipe installed below existing storm drain, including concrete saddle/flowable fill and transition couplings required to connect DIP to PVC, as detailed in the construction documents.
3. No additional payment will be made for dewatering which may be required, as the work is considered incidental to the work and is to be included in the price bid.
4. No additional payment will be made for protection and/or removal and replacement of storm drain since the work is considered incidental and is to be included in the price bid.
5. All ductile iron pipe material for the Storm Drain Crossings has been pre-purchased by the City of Thomasville, to be delivered to the Nucor Facility. The price bid shall include costs for receiving and unloading material.
6. Payment for Storm Drain Crossings will be made at the contract price for each crossing incorporated and accepted into the work and will be full compensation for all work described in the contract documents.

J. Bid Item #20 to #23 – Precast _____ Concrete Manholes & Extra Depth Manhole

1. Payment for installation of precast concrete manholes will be based on the actual number of manholes and extra depth manholes incorporated and accepted into the work. Payment will be full compensation for all work described or shown in the contract documents.
2. Measurements for extra depth manhole will be based on the actual depth, less the 8-ft of depth included with the payment for each manhole. The measurement will be from the top of the ring and cover to the invert of the manhole and measured to the nearest 0.1 ft.

3. No additional payment will be made for excavation, backfilling, ring and covers, flexible boot connections, precast invert, joint materials, vents, or vacuum testing since the work is considered incidental and is to be included in the unit price bid.
4. Payment for precast concrete manholes will be made at the contract price for each “5’-0” Dia. Precast _____ Concrete Manhole” and “5-0” Dia. Extra Depth Precast Concrete Manhole” incorporated and accepted into the work and will be full compensation for all work described in the contract documents.

K. Bid Item #24 – Duplex Submersible Pump Station

1. Payment for installation of the duplex submersible pump station will be based on lump sum price bid for “Duplex Submersible Pump Station”. Payment will be full compensation for all work described or shown in the contract documents.
2. The price bid shall include all components for a fully functional duplex submersible pump station, including 5’ precast wetwell, valve vault, 100 GPM/5 HP submersible pumps, pump bases and guide rails, pump control panel, electrical gear, SCADA system, discharge piping and valves, air release valve inside valve vault, hatches, DIP forcemain and fittings, chainlink fence, 6” ABC access drive, 6” ABC site, and permanent driveway culvert.
3. No additional payment will be made for start-up of pump station in accordance with contract documents as the work is considered incidental and is to be included in the lump sum price bid.
4. Partial payments will be made based on percentage of work completed to date as determined by the Engineer.

L. Bid Item #25 – Manhole/Wetwell Epoxy Liner

1. Payment for installation of epoxy liner inside new precast concrete manholes and wetwell will be based on the actual number of vertical feet of lining incorporated and accepted into the work and measured to the nearest 0.1 foot.
2. The unit price bid shall include surface preparation, humidity control and the placement of a minimum 100-mil thickness epoxy coating, specifically formulated to stop infiltration. Material shall be applied in accordance with all manufacturer’s recommendations.
3. No additional payment will be made for stopping leaks or repairing manhole surface prior to installing cementitious liner as the work is considered incidental to the work and shall be included in the unit price.

M. Bid Item #26 – 4” HDPE Forcemain (Open-Cut)

1. Payment for sanitary sewer force main installed using open-cut construction will be based on the actual length of forcemain incorporated and accepted into the work, measured to the nearest 1.0 foot from start/finish to transition point to other construction methods.
2. No additional payment will be made for excavation (except rock excavation), backfilling, mechanical joint restraint, thrust blocking, testing, traffic control, etc. since the work is considered incidental to the work and is to be included in the unit price bid.
3. No additional payment will be made for fittings/bends required for horizontal or vertical alignment changes since this work is considered incidental and is to be included in the unit price bid.

N. Bid Item #27 – 4” HDPE Forcemain (Horizontal Directional Drilling)

1. Payment for sanitary sewer force main installed using horizontal directional drilling construction will be based on the actual length of forcemain incorporated and accepted into

- the work, measured to the nearest 1.0 foot where drawings indicate that forcemain shall be installed using directional drilling construction methods.
2. No additional payment will be made for excavation (except rock excavation), backfilling, testing, traffic control, etc. since the work is considered incidental to the work and is to be included in the unit price bid.
 3. No additional payment will be made for providing as-built information for horizontal and vertical alignment of all piping installed using horizontal directional drilling since this work is considered incidental to the work and is to be included in the unit price bid.
- O. Bid Item #28 – Forcemain Connection to Existing SSMH
1. Payment for Connection to Existing Sanitary Sewer Manhole will be paid at the contract lump sum price for “Forcemain Connection to Existing SSMH” and will be full compensation for all work described in the contract documents.
 2. The unit price bid shall include approximately 20 LF of 4” DIP, 4” sleeve, 4” 45, and restraints as needed to transition from HDPE forcemain to DIP forcemain adjacent to the existing manhole, as well as provide turn down in manhole as shown in the contract documents since the work is considered incidental to the work and is to be included in the unit price bid.
 3. No additional payment will be made for excavation, coring, bedding, backfilling, testing, etc. since the work is considered incidental to the work and is to be included in the unit price bid.
- P. Bid Item #29 – Sewer Forcemain Air Release Valve
1. Payment for air release manholes and valves will be paid for at the contract unit price for each air release manhole and valve incorporated and accepted into the work. Payment will be full compensation for all work described in the contract documents and as shown on the plans or in the details for “Air Release Manhole”.
 2. No additional payment will be made for the tee, excavation, bedding, manhole, valve, manhole ring and cover, vent (where noted on plans), connection to forcemain, testing, or any other materials or items necessary to place the valve into operation, etc. since the work is considered incidental to the work and is to be included in the unit price bid.
 3. No additional payment will be made for 4” DIP and transitions shown in the contract documents to provide 4” DIP through air release valve manhole, since the work is considered incidental to the work and is to be included in the unit price bid.
 4. Payment for air release manhole and valve installation will be paid for at the contract unit price for each “Air Release Manhole and Valve” incorporated and accepted into the work and will be full compensation for all work described in the contract documents.
- Q. Bid Item #30 to #31 – Sanitary Sewer Service
1. Payment for sanitary sewer services will be paid for at the contract unit price for each “4” Sanitary Sewer Service Tap and Cleanout” incorporated and accepted into the work. Payment will be full compensation for all work described in the contract documents.
 2. The unit price bid for “4” Sanitary Sewer Service Tap and Cleanout – Connected to Manhole” shall include 4” PVC service line and cleanout, trace wire, coring of the manhole, and inside drop as required in the construction detail drawings.
 3. Payment for air release manhole and valve installation will be paid for at the contract unit price for each “4” Sanitary Sewer Service Tap and Cleanout” incorporated and accepted into the work and will be full compensation for all work described in the contract documents.

R. Bid Item #32 – Concrete Pad Repair

1. Measurement for concrete driveway repair will be based on the actual number of square yards of concrete placed and accepted into the work. Work includes fine grading, excavation, removal of temporary stone, saw cutting and demolishing existing concrete, installation of dowels, installation of stone base, and placement of new concrete.
2. Payment for concrete will be based on the actual number of square yards of concrete and placed and accepted into the work.
3. Concrete Driveway Repair is to be limited to the maximum width of the trench plus 12” on each side, up to a maximum of 10 feet. Contractor is to provide tickets from concrete supplier to verify yardage with expected square yards.
4. No additional payment will be made beyond 12” on each side of trench unless approved by the Resident Project Representative.
5. No additional payment will be made for testing or other work described in the contract documents.

S. Bid Item #33 – Prime Lumber Entrance Repair

1. Payment for “Prime Lumber Entrance Repair” will be based on the actual tonnage of stone placed and accepted into the work. Work includes fine grading and placement of 4” of ABC stone top dressing for gravel driveway used for construction access, after construction is complete and driveway is no longer being used for construction access. No stone placement will take place until written direction is received from the Engineer.
2. Payment will be based on the actual number of tons based on quarry tickets. Quarry tickets shall be given to inspector at time of delivery and pay item will be marked on ticket. Tickets not given to Resident Project Representative will not be paid for. Stone wasted or not used in the opinion of the Resident Project Representative shall be deducted from the quarry tickets.
3. No additional payment will be made for backfill, compact stone, etc. in driveways or to dispose of the excavated materials since the work is considered incidental to the work and is to be included in the unit price bid.
4. Payment for installation of driveway top dressing will be paid for at the contract unit price per ton for “Prime Lumber Entrance Repair” incorporated and accepted into the work and will be full compensation for all work described in the contract documents.

T. Bid Item #34 – Woven Wire Fence

1. Payment for woven wire fencing and gates installed will be based on the actual length of fencing incorporated and accepted into the work, measured to the nearest 1.0 foot. Payment will be full compensation for all work described or shown in the contract documents.
2. No additional payment will be made for installation of gates shown on contract documents since the work is considered incidental and is to be included in the unit price bid.

U. Bid Item #35 – Rock Excavation

1. Payment for rock excavation will be based on the actual number of cubic yards incorporated and accepted into the work and measured to the nearest 0.1 cubic yard.
2. The Resident Project Representative will measure Rock Excavation. Computations will be based on the length multiplied by the average depth (including 6-inches below pipe invert) multiplied by the width (actual average width up to five-feet (5’) maximum).

3. Measurement of manholes and structures will be the average depth (including 6-inches below bottom of manhole) multiplied by the square of the average width (3 feet beyond the outside wall of the structure).
4. No additional payment will be made for pre or post blast survey, monitoring blasting operations and/or trench rock excavation beyond the limits indicated above without written approval of the Engineer since the work is considered incidental to the work being paid for at the contract unit price.
5. No additional payment will be made for providing suitable off-site borrow excavation to backfill trenches where rock has been removed, since the work is to be included in the unit price bid for trench rock excavation.
6. Payment for trench rock excavation will be made at the contract unit price per cubic yard for "Rock Excavation" incorporated and accepted into the work and will be full compensation for all work described in the contract documents. The Contractor's unit price bid shall not be lower than \$30.00 per cubic yard.
7. No subsurface reports are available for the project. Estimated quantity is only an estimate. No additional payment will be made for over or under runs on estimated quantity.
8. Rock not measured by and verified by the Resident Project Representative will not be eligible for payment.

V. Bid Item #36 – Contingency Allowance

1. A contingency allowance specified in each bid form is included in the bid. This allowance may be used at the discretion of the owner to pay for additional work items, if necessary. Use of the contingency allowance will require a signed work order or a change order.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable)

END OF SECTION 01025

SECTION 01027

APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1-16 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements governing the Contractor's Applications for Payment.
- B. Related Sections: The following Sections contain requirements that relate to this Section.
 - 1. Bid Form for unit price quantities and bid amounts.
 - 2. Division 1 – All Sections
 - 3. Division 2 – All Sections
 - 4. Division 3 – All Sections

1.3 SCHEDULE OF VALUES

- A. The estimated quantities and unit prices established on the Bid Form shall be the basis for the schedule of values.
- B. Format and Content: The Application for Payment shall consist of two (2) components. The first shall be a summary sheet and the second will be an itemized quantity and value sheet.
 - 1. The following information shall be on the summary sheet:
 - a. Identification:
 - 1) Project name and location
 - 2) Name and address of Engineer
 - 3) Project number
 - 4) Contractor's name and address
 - 5) Date of submittal
 - 6) Application for Payment Number and Period Covered
 - b. Summary of Payment Request
 - 1) Contract sum
 - 2) Construction to date
 - 3) Less retainage
 - 4) Amount construction to date
 - 5) Plus material inventory
 - 6) Gross amount due
 - 7) Percent complete

- c. Certification Statements
 - 1) Contractor to certify that work has been completed in accordance with Contract Documents, that all amounts have been paid for items which previous Applications for Payments were issued and payments received, and that the current payment is now due. Funds hereby received will be used to pay herein listed items to the extent needed.
 - 2) Certification statement is to be notarized.
 - 3) Engineer's certification statement.
 - a) In our opinion, the above application for payment by the contractor is a substantially correct statement of performance in accordance with the Contract Documents and the contractor is entitled to payment as requested.
2. The following information shall be on the itemized quantity sheet:
 - a. Identification:
 - 1) Project name and location
 - 2) Name of Engineer
 - 3) Project number
 - 4) Contractor's name
 - 5) Application for payment number and period covered.
 - b. Arrange the scheduled values in tabular form with separate columns to indicate the following information:
 - 1) Item number
 - 2) Description of work
 - 3) Scheduled quantity and unit
 - 4) Unit price and scheduled value
 - 5) Previous quantity and amount
 - 6) Current quantity and amount
 - 7) To date quantity and amount
 - 8) Remaining quantity and amount
 - 9) Totals for previous, current, to date and remaining amounts
 - c. A material inventory statement is to be provided for which payment request includes stored materials not incorporated into the work. The following information is to be provided.
 - 1) Project name and location
 - 2) Date
 - 3) Item description
 - 4) Previous on hand quantity
 - 5) Delivered quantity
 - 6) Quantity incorporated into work
 - 7) Quantity on hand this application
 - 8) Unit price
 - 9) Amount due
 - 10) Copies of statements or invoices from suppliers shall be submitted.
 - d. See Sample Application for Payment page 01027-5 & 6

1.4 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Engineer and paid for by the Owner.
 - 1. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.
- B. Payment-Application Times: The date for each progress payment is the 25th day of each month. The period covered by each Application for Payment starts on the day following the end of the preceding period.
- C. Payment-Application Forms: Use forms approved by the Engineer for Applications for Payment which includes the information described in Section 1-3.
- D. Application Preparation: Complete every entry on the form. Include notarization and execution by a person authorized to sign legal documents on behalf of the Contractor. Verify quantities with inspector. The Engineer will return incomplete applications without action.
 - 1. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.
- E. Transmittal: Submit 4 signed and notarized original copies of each Application for Payment to the Engineer. One copy shall be complete, including waivers of lien and similar attachments, when required.
 - 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information related to the application, in a manner acceptable to the Engineer.
- F. Initial Application for Payment: Administrative actions and submittals, that must precede or coincide with submittal of the first Application for Payment, include the following:
 - 1. List of subcontractors.
 - 2. List of principal suppliers.
 - 3. Contractor's Construction Schedule (preliminary if not final).
 - 4. Certificates of insurance and insurance policies.
 - 5. Shop drawings and product data sheets.
- G. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment.
 - 1. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
 - 2. Administrative actions and submittals that shall precede or coincide with this application include:
 - a. Warranties (guarantees) and maintenance agreements.
 - b. Final cleaning.
 - c. Application for consent of surety.
 - d. List of incomplete Work, recognized as exceptions to Engineer's Certificate of Substantial Completion.

- H. Final Payment Application: Administrative actions and submittals that must precede or coincide with submittal of the final Application for Payment include the following:
1. Completion of Project closeout requirements.
 2. Completion of items specified for completion after Substantial Completion.
 3. Ensure that unsettled claims will be settled.
 4. Ensure that incomplete Work is not accepted and will be completed without undue delay.
 5. Transmittal of required Project construction records to the Owner.
 6. Proof that taxes, fees, and similar obligations were paid.
 7. Removal of temporary facilities and services.
 8. Removal of surplus materials, rubbish, and similar elements.

1.5 RETAINAGE

- A. An amount equal to 5% of the total contract amount due on the Application for Payment will be deducted and retained by the owner until the work is complete.

1.6 SALES TAX STATEMENT

- A. Sales tax statement shall accompany all Applications for Payment. If no sales tax was paid during the application period, contractor shall submit sales tax statement stating no sales tax was paid. Sales tax statement shall have the following information:
1. Identification:
 - a. Project name and location
 - b. Name of engineer
 - c. Project number
 - d. Contractor's name and address
 - e. Date
 - f. Period covered
 2. Sales Tax Information:
 - a. Invoice date and number
 - b. Supplier
 - c. County material purchased
 - d. Net cost
 - e. State tax amount
 - f. County tax amount
 3. Certification Statement
 - a. I hereby certify that the above listed materials have been or will be used on the subject project and that the information provided is correct to the best of my knowledge.
 4. See sample sales tax sheet page 01027-7

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01027

alley, williams, carmen & king, inc.
 engineers and architects
 740 chapel hill road
 burlington, north carolina 27215



Statement of SALES TAX PAID on Materials used for:

Project _____ Contract for _____

 _____ Period Ending _____

Date	Supplier	County	Invoice No.	Material Invoiced	Net Cost	N.C. Tax	County Tax
TOTALS							

I hereby certify that the above listed material is to be used on the subject project and that the information and quantities are correct to the best of my knowledge.

Name _____ Date _____

Company _____

Address _____

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SECTION 01039

COORDINATION AND MEETINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1-16 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Coordination and project conditions.
- B. Staking.
- C. Preconstruction conference.
- D. Progress meetings.

1.3 COORDINATION AND PROJECT CONDITIONS

- A. Coordinate scheduling, submittals, and Work of the various Sections of the Specifications in compliance with the requirements of the General Conditions to ensure efficient and orderly sequence of installation of interdependent construction elements.
- B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing to, and placing in service, such equipment.
- C. Coordinate space requirements, supports, and installation of mechanical and electrical Work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished areas, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- E. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion.
- F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.4 STAKING

- A. Engineer has provided base line reference control and staking plan and benchmark at the site. Engineer will stake one time all manholes, sewer lines, and appurtenances and provide offset hubs and cut sheets. All other staking to be provided by Contractor.
- B. Confirm drawing dimensions and elevations.
- C. Establish elevations, lines, and levels from reference points, utilizing recognized engineering survey practices.
- D. During construction, furnish stakes and competent Engineer's helpers for checking elevations, lines, and levels deemed necessary by Engineer.

1.5 PRECONSTRUCTION CONFERENCE

- A. Owner will schedule a conference after Notice of Award.
- B. Attendance Required: Owner, Engineer, Contractor, Contractor's Superintendent, and major Subcontractors.
- C. Agenda:
 - 1. Submission of insurance certificates.
 - 2. Distribution of Contract Documents.
 - 3. Submission of list of Subcontractors, schedule of values, schedule of Shop Drawings and Sample Submittals, and progress schedule.
 - 4. Designation of personnel representing the parties in Contract, Engineer, and others as appropriate.
 - 5. Procedures and processing of field decisions, submittals, substitute and "or equals", applications for payments, Change Orders, and Contract closeout procedures.
 - 6. Scheduling.
 - 7. Use of premises by Owner and Contractor.
 - 8. Baseline staking and building offset layout.
 - 9. Security and housekeeping procedures.
 - 10. Procedures for testing.
 - 11. Procedures for maintaining record documents.
 - 12. Requirements for start-up of equipment.
 - 13. Inspection and acceptance of equipment put into service during construction period.
 - 14. Contractor's safety representative.
 - 15. Owner's safety policies and training.
- D. Engineer will record minutes and distribute copies within three working days after meeting to participants, and those affected by decisions made.

1.6 PROGRESS MEETINGS

- A. Engineer to schedule and administer meetings throughout progress of the Work at maximum monthly intervals or as otherwise deemed necessary by Owner or Engineer.

- B. Engineer to make arrangements for meetings, prepare agenda with copies for participants, preside at meetings, give 72 hours prior notice.

- C. Attendance Required: Contractor's job superintendent and office representative managing job, major subcontractors and suppliers, Owner, Engineer, as appropriate to agenda topics for each meeting.

- D. Agenda:
 - 1. Review minutes of previous meetings.
 - 2. Review of Work progress.
 - 3. Field observations, problems, and decisions.
 - 4. Identification of problems which impede planned progress.
 - 5. Review of submittals schedule and status of submittals.
 - 6. Review of off-site fabrication and delivery schedules.
 - 7. Maintenance of progress schedule.
 - 8. Corrective measures to regain projected schedules.
 - 9. Planned progress during succeeding work period.
 - 10. Coordination of projected progress
 - 11. Maintenance of quality and work standards.
 - 12. Effect of proposed changes on progress schedule and coordination.
 - 13. Other business related to Work.

END OF SECTION 01039

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SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1-16 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Submittal procedures
- B. Schedule of values
- C. Construction progress schedules
- D. Shop drawings
- E. Certificates
- F. Manufacturer's instructions

1.3 SUBMITTAL PROCEDURES

- A. Transmit each submittal with Engineer accepted form.
- B. Identify Project, Contractor, Subcontractor or Supplier; pertinent drawing and detail number, and specification section number, as appropriate.
- C. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of materials and equipment required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.
- D. Schedule submittals to expedite the Project and deliver to Engineer at business address. Coordinate submission of related items.
- E. For each submittal for review, allow a minimum of 15 working days excluding delivery time to and from the Contractor.
- F. Identify variations from Contract Documents and material, equipment or system limitations which may be detrimental to successful performance of the completed Work.
- G. Provide space for Contractor and Engineer review stamps.
- H. When revised for resubmission, identify all changes made since previous submission.

- I. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
- J. Submittals not requested will not be recognized or processed.

1.4 SCHEDULE OF VALUES

- A. Provide to the Engineer a Schedule of Values for determining construction progress.
- B. The Schedule shall include the following at a minimum (as agreed upon by Town Staff prior to issuing Notice to Proceed):
 - 1. Mobilization
 - 2. Bypass Pumping System
 - 3. Sitework/Dumpster Pad
 - 4. Barscreen and Installation
 - 5. Flowmeter and Installation

1.5 CONSTRUCTION PROGRESS SCHEDULES

- A. Each Contractor to develop and maintain progress schedule in compliance with all of the General Conditions, and the following:
 - 1. Submit four copies of preliminary progress schedule at preconstruction conference.
 - 2. Revise and resubmit as required.
 - 3. Submit revised schedule with each Application for Payment, identifying changes since previous version.
 - 4. Submit network analysis diagram using the critical path method, as outlined in Associated General Contractors of America (AGC) publication "The Use of CPM in Construction – A Manual for General Contractors and the Construction Industry".
 - 5. 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.
 - 6. Indicate estimated percentage of completion for each item of Work at each submission.

1.6 SHOP DRAWINGS

- A. Shop Drawings are required for the following items: submersible pumps, pump controls, pipe, fittings, wiring, conduit, manholes, and casing pipe. Shop Drawings for additional items shall be submitted when deemed necessary by Engineer.
- B. Submit the number of copies which the Contractor requires, plus two copies which will be retained by the Engineer. Shop Drawing submittals in the form of prints, such as piping layouts, steel reinforcing, structural steel, miscellaneous metals, electrical layouts, etc., at Contractor's option, may include two copies – one reproducible transparency and one opaque reproduction. The reproducible transparency will be returned with Engineer's comments noted. The use of reproducible transparencies is encouraged whenever possible.

- C. Contractor may utilize contract Drawings with necessary details marked thereon for electrical conduit layout drawings. However, the drawings must have Contractor's title block in lieu of Engineer's title block.
- D. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturer's standard data to provide information specific to this Project.
- E. For factory primed and factory finished materials and equipment to be field painted, indicate coatings manufacturer and type; for completely factory finished materials and equipment not to be field painted, indicate coatings manufacturer and type, and include full range of manufacturer's standard colors for finish color selection by Owner.
- F. After review, distribute in accordance with the Submittal Procedures article above and provide copies for record documents described in Section 01700 – Contract Closeout.

1.7 CERTIFICATES

- A. When specified in individual specification section, submit certification by the manufacturer, installation/application subcontractor, or the Contractor to Engineer, in quantities specified for Shop Drawings.
- B. Indicate material or equipment conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or equipment but must be acceptable to Engineer.

1.8 MANUFACTURER'S INSTRUCTIONS

- A. Submit one copy of manufacturer's printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing as received by Contractor to Engineer and a duplicate copy to the Owner.
- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01300

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SECTION 01400
QUALITY CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1-16 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Quality assurance – control of installation.
- B. Tolerances.
- C. References and standards.
- D. Testing services.
- E. Manufacturer’s field services.
- F. Examination.
- G. Preparation.

1.3 QUALITY ASSURANCE – CONTROL OF INSTALLATION

- A. Monitor quality control over Suppliers, manufacturers, materials, equipment, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturer’s instructions, including each step, in sequence.
- C. Should manufacturer’s instructions conflict with Contract Documents, manufacturer’s instructions shall take precedence.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure materials and equipment in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.4 TOLERANCES

- A. Monitor fabrication and installation tolerance control of materials and equipment to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturer’s tolerances. Should manufacturer’s tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.

- C. Adjust materials and equipment to appropriate dimensions; position before securing in place.

1.5 REFERENCES AND STANDARDS

- A. For materials, equipment, or workmanship specified by association, trade, or other consensus standards, complies with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date for receiving bids, except where a specific date is established by code.
- C. Obtain copies of standards where required by specification sections.
- D. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Engineer shall be altered from the Contract Documents by mention or inference otherwise in any reference document.
- E. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards generating organization, authority having jurisdiction, or other entity applicable to the context of the text provision. Refer to the "Encyclopedia of Associations", published by Gale Research Co., available in most libraries.

1.6 TESTING SERVICES

- A. Contractor shall be responsible for and shall pay for all testing required per contract documents.
- B. The independent firm will perform tests and other services specified in individual specification sections and as required by the Engineer.
- C. Testing and source quality control may occur on or off the project site.
- D. Reports will be submitted by the independent firm to the Engineer and Contractor, in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
- E. Furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
- F. Notify Engineer and Owner prior to expected time for operations requiring services.
- G. Make arrangements and pay for additional samples and tests required for Contractor's use.
- H. Contractor shall be responsible for, and shall pay for:
- I. Additional testing expenses resulting from Contractor's failure to advise Engineer and Owner hours in advance of operations.
- J. Additional testing expenses resulting from changes in Contractor's schedule after Engineer has been notified that testing is required, canceled, or modified.
- K. Testing does not relieve Contractor to perform Work to contract requirements.

- L. Re-testing required because of non-conformance to specified requirements shall be performed by the same independent firm on instructions by the Engineer.

1.7 MANUFACTURER'S FIELD SERVICES

- A. When specified in individual Specifications Sections, require material or equipment suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, and quality of workmanship as applicable, and to initiate instructions when necessary.
- B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturer's written instructions.
- C. Prior to leaving the Project and for each visit, complete a Manufacturer's Service Representative's Report as included at the end of this Section. Copies of the Report will be available for use on the Project.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 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 specification sections.
- D. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- E. Complete motor circuit, feeder circuit, ground, and DC hypotential tests required under Division 16 prior to any operational testing of appurtenant equipment.

3.2 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

END OF SECTION 01400

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SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Divisions 1-16 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for construction facilities and temporary controls, including temporary utilities, support facilities, and security and protection.
- B. Temporary utilities include, but are not limited to, the following:
 - 1. Temporary electric power and light.
 - 2. Telephone service.
 - 3. Sanitary facilities, including drinking water.
 - 4. Storm drainage.
- C. Support facilities include, but are not limited to, the following:
 - 1. Field offices and storage sheds. (Optional).
 - 2. Construction aids and miscellaneous services and facilities.
- D. Security and protection facilities include, but are not limited to, the following:
 - 1. Temporary fire protection.
 - 2. Barricades, warning signs, and lights.
 - 3. Environmental protection.

1.3 QUALITY ASSURANCE

- A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:
 - 1. Building code requirements.
 - 2. Health and safety regulations.
 - 3. Utility company regulations.
 - 4. Police, fire department, and rescue squad rules.
 - 5. Environmental protection regulations.
 - 6. Manual Uniform Traffic Control Devices
- B. Standards: Comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities."

1. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 "National Electric Code."

- C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.4 PROJECT CONDITIONS

- A. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.

- B. Traffic Control: Contractor shall provide traffic control measures in accordance with NCDOT standard details, as shown on Construction Drawings, and in accordance with NCDOT regulations. All traffic control devices shall be in condition satisfactory to NCDOT personnel and Engineer for the intended use of the device.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide new materials. If acceptable to the Engineer, the Contractor may use undamaged, previously used materials in serviceable condition. Provide materials suitable for use intended.

- B. Water: Provide potable water approved by local health authorities.

2.2 EQUIPMENT

- A. Temporary Toilet Units: Provide self-contained, single-occupant toilet units of the chemical, aerated recirculation, or combustion type. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.

- B. Fire Extinguishers: Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the exposures.

1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.1. INSTALLATION

- A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2. TEMPORARY UTILITY INSTALLATION

- A. General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.
 - 1. Arrange with company and existing users for a time when service can be interrupted, if necessary, to make connections for temporary services.
 - 2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
 - 3. Obtain easements to bring temporary utilities to the site where the Owner's easements cannot be used for that purpose.
 - 4. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Engineer. Neither the Owner nor Engineer will accept cost or use charges as a basis of claims for Change Orders.
- B. Temporary Telephones: Provide temporary telephone service throughout the construction period for all personnel engaged in construction activities.
 - 1. Provide mobile telephone for construction crew foreman.
- C. Sanitary facilities include temporary toilets. Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.
 - 1. Provide toilet tissue and similar disposable materials for each facility. Provide covered waste containers for used material.
- D. Drinking-Water Facilities: Provide containerized, tap-dispenser, or bottled-water drinking-water units, including paper supply.
- E. Temporary Drainage Provisions: Contractor shall provide for the drainage of storm water and such water as may be applied or discharged on the site in performance of the work. Drainage facilities shall be adequate to prevent damage to the work, the site, and adjacent property.

3.3. SUPPORT FACILITIES INSTALLATION

- A. Field Offices: Not required.
- B. Temporary Paving: Not required for temporary facilities.

- C. Construction Aids: Contractor for each Section shall furnish, install, maintain, and operate all construction aids required by him and his Subcontractors in the performance of the work, except as otherwise provided herein.

3.4. SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations."
 - 1. Locate fire extinguishers where convenient and effective for their intended purpose.
 - 2. Maintain unobstructed access to fire extinguishers and other access routes for fighting fires.
- B. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting, including flashing red or amber lights.
- C. Security Enclosure and Lockup: Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
 - 1. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.
- D. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted or that other undesirable effects might result. Restrict use of noise-making tools and equipment to hours that will minimize complaints from persons or firms near the site.
 - 1. Contractor shall take responsible measures to avoid unnecessary noise. Such measures shall be appropriate for the normal ambient sound levels in the area during working hours. All construction machinery and vehicles shall be equipped with practical sound muffling devices, and operated in a manner to cause the least noise consistent with efficient performance of the work.
 - 2. Contractor shall take reasonable measures to prevent unnecessary dust. Earth surfaces subject to dusting shall be kept moist with water or by application of a chemical dust suppressant. When practicable, dusty materials in piles or in transit shall be covered to prevent blowing.
 - 3. Contractor shall prevent the pollution of drains and watercourses by sanitary wastes, sediment, debris, and other substances resulting from construction activities. No sanitary wastes will be permitted to enter any drain or watercourse other than sanitary sewers. No sediment, debris, or other substance will be permitted to enter sanitary sewers, and reasonable measures will be taken to prevent such materials from entering any drain or watercourse.
- E. Traffic Control: Provide traffic control protection to traveling public and workers in accordance with NCDOT, and OSHA requirements. All traffic control operations shall be conducted in a method that will minimize impacts to the traveling public.

3.5. OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Termination and Removal: Unless the Engineer requests that it be maintained longer, remove each temporary facility when the need has ended, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are the Contractor's property.
 - 2. Remove temporary roads not intended for or acceptable for integration into permanent use. Where the area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil in the area. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at the temporary entrances, as required by the governing authority.

END OF SECTION 01500

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SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1-16 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Products.
- B. Transportation and handling.
- C. Storage and protection.
- D. Product options.
- E. Substitutes and “or equal” items.
- F. Equipment and Material Checklist.

1.3 PRODUCTS

- A. Do not use secondhand or salvaged materials and equipment whether removed from existing premises or from another source.
- B. Provide interchangeable components of the same manufacture for components being replaced.

1.4 TRANSPORTATION AND HANDLING

- A. Transport and handle products in accordance with manufacturer’s instructions.
- B. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.5 STORAGE AND PROTECTION

- A. Store and protect products in accordance with manufacturer’s instructions.
- B. Store with seals and labels intact and legible.
- C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

- D. For exterior storage of fabricated products, place on sloped supports above ground.
- E. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- F. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- G. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- H. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.
- I. Provide lubricants and perform initial lubrication and all subsequent lubrication until Substantial Completion. Lubricants and lubrication shall be in accordance with equipment manufacturer's instructions.

1.6 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.
- B. Products Specified by Naming Manufacturers: Products of manufacturers named in the Specifications or included by Addenda as an "or equal" prior to receipt of Bids. No options or substitutions shall be allowed except as permitted under following Article 1.7.

1.2 SUBSTITUTES AND "OR EQUAL" ITEMS

- A. Engineer will consider requests for substitute and "or equal" items after date of Owner-Contractor Agreement only if the specified item becomes unavailable through no fault of Contractor.
- B. Submit written application for use of substitute and "or equal" items.

1.7 EQUIPMENT AND MATERIAL CHECKLIST

- A. Refer to the list below for items requiring shop drawings, manufacturer's start-up services, spare parts, and operation and maintenance manuals. Requirements over and above those included in the General Conditions and this and other Sections of Division 1 shall be as included in the individual specification sections.
 - 1. Pump Station – Pump Equipment
 - 2. Pump Station – Electrical Equipment
 - 3. Pump Station – Mechanical Equipment
 - 4. Manholes, Pipe, Fittings, Valves, Wiring, Conduit, etc. (all materials)

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01600

SECTION 01610

GENERAL EQUIPMENT STIPULATIONS

1. SCOPE. All equipment furnished and installed under this Section shall conform to the general stipulation set forth in this section, except as otherwise specified in other sections. Drawings and general provisions of the contract, including General Conditions, Supplementary General Conditions and other Division 1-16 Specification Sections apply to this Section.
2. COORDINATION. Contractor shall coordinate all details of the equipment with other related parts of the Work, including verification that all structures, piping, wiring, and equipment components are compatible. Contractor shall be responsible for all structural and other alterations in the Work required to accommodate equipment differing in dimensions or other characteristics from that contemplated in the Contract Drawings or Specifications.
3. WORKMANSHIP AND MATERIALS. Contractor shall guarantee all equipment against faulty or inadequate design, improper assembly or erection, defective workmanship or materials, and leakage, breakage or other failure. Materials shall be suitable for service conditions.

All equipment shall be designed, fabricated and assembled in accordance with recognized and acceptable engineering and shop practice. Individual parts shall be manufactured to standard sizes and gauges so that repair parts, furnished at any time, can be installed in the field. Like parts of duplicate units shall be interchangeable. Equipment shall not have been in service at any time prior to delivery, except as required by tests.

4. LUBRICATION. Equipment shall be adequately lubricated by systems which require attention no more frequently than weekly during continuous operation. Lubrication systems shall not require attention during start-up or shutdown and shall not waste lubricants.

Lubricants of the types recommended by the equipment manufacturer shall be provided in sufficient quantities to fill all lubricant reservoirs and to replace all consumption during testing, start-up and operation prior to acceptance of equipment by Owner.

Lubrication facilities shall be convenient and accessible. Oil drains and fill openings shall be easily accessible from the normal operating area or platform. Drains shall allow for convenient collection of waste oil in containers from the normal operating area or platform without removing the unit from its normal installed position.

5. SAFETY GUARDS. All belt or chain drives, fan blades, couplings and other moving or rotating parts shall be covered on all sides by a safety guard. Safety guards shall be fabricated from 16 USS gauge or heavier galvanized or aluminum-clad sheet steel or ½ inch mesh galvanized expanded metal. Each guard shall be designed for easy installation and removal. All necessary supports and accessories shall be provided for each guard. Supports and accessories, including bolts, shall be galvanized. All safety guards in outdoor locations shall be designed to prevent the entrance of rain and dripping water.
6. ANCHOR BOLTS. Equipment suppliers shall furnish suitable anchor bolts for each item of equipment. Anchor bolts, together with templates or setting drawings, shall be delivered sufficiently early to permit setting the anchor bolts when the structural concrete is placed. Anchor bolts shall comply with the anchor bolts and expansion anchors sections and, unless otherwise specified, shall have a minimum diameter of ¾ inch.

Unless otherwise indicated or specified, anchor bolts for items of equipment mounted baseplates shall be long enough to permit 1 ½ inches minimum of grout, or as required by the manufacturer, beneath the baseplate and to provide adequate anchorage into structural concrete.

7. SHOP PAINTING. All steel and iron surfaces shall be protected by suitable paint or coatings applied in the shop. Surfaces which will be inaccessible after assembly shall be protected for the life of the equipment. Exposed surfaces shall be finished, thoroughly cleaned, and filled as necessary to provide a smooth, uniform base for painting. Electric motors, speed reducers, starters, and other self-contained or enclosed components shall be shop primed or finished with high-grade, oil-resistant enamel suitable for top coating in the field with alkyd enamel. Coating shall be suitable for the environment where equipment is installed.

Surfaces to be painted after installation shall be prepared for painting as recommended by the paint manufacturer for the intended surface, and then shop painted with one or more coats of the specific primer. Unless otherwise specified, the shop primer for steel and iron surfaces shall be Ameron “Amercoat 3153A Universal Primer”, Cook “391-N-167 Barrier Primer”, Kop-Coat “340 Gold Primer”, Tnemec “37-77 Chem-Prime”, or Valspar “13-R-28 Chromox Primer”.

Machined, polished, and nonferrous surfaces which are not to be painted shall be coated with rust-preventive compound, Houghton “Rust Veto 344”.

8. EQUIPMENT LABELS. All electric equipment, including panels and enclosures shall be approved by the Underwriters Laboratory Inc. and have the UL Label displayed.

END OF SECTION 01610

SECTION 01620

PROJECT SPECIAL PROVISIONS

1. VIDEO OF GRAVITY SEWER

All sanitary sewer lines shall be videotaped prior to acceptance and placement into service. The contractor shall be responsible for taping and all costs associated with taping for all projects. A DVD format disc shall be furnished by the contractor at the initial inspection and upon the completion of any repairs. The video shall be clear and well lit, with the top of pipe in the top of the screen. A written inspection log for all video inspections shall accompany each tape. Logs shall accurately measure distances measured from center point of each manhole and shall clearly show location in relation to the manhole all points of significance in the sewer line. As a minimum, each log shall include the location and left/right orientation of all service laterals, location and depth of sags, offset pipes, or any other points of significance. Additionally, each record shall accurately describe the above ground location of the manhole section including street name, direction revealed (north, south, etc.) direction of flow, adjoining house numbers, and any other landmarks that will clearly and quickly identify the section. All defects and deficiencies discovered in the inspection shall be corrected by the contractor to the satisfaction of the Engineer and at the contractor's expense. Once the defects and deficiencies are corrected the sanitary sewer shall be videotaped again to show that the defect and deficiencies have been resolved.

2. CONCRETE REACTION BLOCKING AND CONCRETE THRUST RESTRAINT.

In addition to mechanical joint restraint, all fittings, valves and other components subject to hydrostatic thrust shall be securely anchored by use of concrete reaction blocks, or concrete thrust ring restraint poured in place unless otherwise directed by the Engineers. The reaction areas required for these thrust blocks shall conform to Section 12AWWA C-600. 2.5 mil Polyethylene shall be wrapped around fittings and bolts.

Material for blocking shall be 3000 psi concrete minimum. The use of site mixed concrete is prohibited.

3. SAFETY AND TRENCH SHORING DESIGN.

The contractor shall follow all OSHA guidelines related to construction safety and follow industry, locate, state and other standards related to safety. The contractor shall pay for and provide sealed engineering design for shoring any trench excavations over 15' in depth or as required by OSHA or as otherwise specified by State or Local code/regulation.

4. E-VERIFY BACKGROUND CHECKS.

"Background Checks. The Contractor shall conduct or arrange to have conducted, at its own expense, checks on each of its employees, agents, ownership personnel, contract employees, subcontractors, materials suppliers or others who will engage in any service on or delivery of goods for this Project, to verify that those individuals may legally work in the United States and that they are not registered sex offenders. For the Contractor's convenience, the required registry checks may be completed by accessing the United States Citizenship and Immigration Services 'E-Verify' website at <http://www.uscis.gov>. The Contractor shall provide certification that the registry checks were conducted on each of its contractual personnel providing services or delivering goods prior to commencement of such services or the delivery of such goods. The Contractor shall conduct a current initial check of the registries not more than 30 days prior to the start of Work. In addition, the Contractor agrees to conduct the registry checks and provide a supplemental certification before any additional contractual personnel are used to deliver goods or provide services pursuant to this Project. The Contractor further agrees to conduct annual registry checks of all contractual personnel and

provide annual certifications at each Contract anniversary date. The Contractor shall not assign any individual to deliver goods or provide services for this Project if said individual is not legally eligible to work in the United States. The Contractor agrees that it will maintain all records and documents necessary to demonstrate that it has conducted a thorough check of the registries as to each contractual person and agrees to provide such records and documents upon school system request. The Contractor specifically acknowledges that the Owner retains the right to audit these records to ensure compliance with this section at any time, at the Owner's sole discretion. The Owner reserves the right to prohibit any contractual personnel of the Contractor from delivering goods or providing services relative to this Project if the Owner determines, in its sole discretion, that such contractual personnel may pose a threat to the safety or well-being of the public. Failure to comply with the terms of this provision shall be deemed a material breach of the Agreement.”

5. TRACER WIRE AND METALLIC MARKING TAPE

The contractor shall install tracer wire and metallic warning tape when installing all non-metallic pipe materials. Tracer wire shall be installed no greater than 8 feet deep. When the utility is less than 8 feet deep, the tracer wire shall be affixed to the utility at 10 linear foot intervals. Metallic warning tape shall be installed approximately 18 inches from finished ground surface for all utilities (metallic pipe included).

6. GENERAL PROVISIONS.

The City of Thomasville Standard Specifications and Details shall be used should any items not be covered in these specifications. Should any item appear to be in conflict the more restrictive shall be used. The Engineer will make the final determination on any discrepancy.

7. CONSTRUCTION STAKING.

The Engineer will stake one time all manholes, horizontal bends. Additional or restaking will be paid for or provided by the contractor.

8. PRECAST CONCRETE STRUCTURE – BUOYANCY CALCULATIONS.

The contractors precast supplier shall provide for design and buoyancy calculations for manholes. The precast design shall be sealed by a North Carolina Registered Engineer.

END OF SECTION 01620

SECTION 01650

START-UP

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1-16 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Starting equipment and systems.
- B. Manufacturer's start-up services.

1.3 STARTING EQUIPMENT AND SYSTEMS

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Engineer seven days prior to start-up of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify that wiring and support components for equipment are complete and tested.
- F. Execute start-up with Contractor's personnel in accordance with manufacturer's instructions.

1.4 MANUFACTURER'S START-UP SERVICES

- A. Furnish competent factory trained service representatives to supervise or inspect the installation; test, align, adjust and calibrate the equipment and systems as necessary; and instruct plant personnel in their operation and maintenance (Manufacturer's Start-Up Services).
- B. Submit qualifications of manufacturer's service representative to Engineer 30 days in advance of arrival on Project. Manufacturer's service representative subject to approval of Engineer.
- C. Notify Engineer a minimum of 72 hours prior to the arrival of the service representatives on the Project.
- D. Prior to leaving the Project and for each visit, manufacturer's service representative shall complete a Manufacturer's Service Representative's Report. Copies of the Report will be available for use on the Project.
- E. Owner shall have the right to audio/video tape all sessions regarding equipment and system operation and maintenance instructions.

- F. Manufacturer's start-up services shall be provided as required until operation of the equipment is satisfactory to Engineer at no additional cost to Owner.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01650

SECTION 01700
CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Divisions 1-16 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Project record document submittal.
 - 3. Operation and maintenance manual submittal.
 - 4. Submittal of warranties.
 - 5. Final cleaning.
- B. Closeout requirements for specific construction activities are included in the appropriate Sections.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List any exceptions in the request.
 - 1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete.
 - a. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
 - b. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
 - 2. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
 - 3. Submit record drawings, damage or settlement surveys, property surveys, and similar final record information.
 - 4. Discontinue and remove temporary facilities from the site, along with construction tools, and similar elements.
 - 5. Complete final cleanup requirements.

- B. Inspection Procedures: Upon receipt of a request for inspection, the Engineer will either proceed with inspection or advise the Contractor of unfilled requirements. The Engineer will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
1. The Engineer will repeat inspection when requested and assured that the Work is substantially complete.
 2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.4 FINAL ACCEPTANCE

- A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List any exceptions in the request.
1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted.
 2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
 3. Submit a certified copy of the Engineer's final inspection list of items to be completed or corrected, endorsed and dated by the Engineer. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance and shall be endorsed and dated by the Engineer.
 4. Submit Contractor's Affidavit of Payment of Debts and Claims (see attached sample at end of Section).
 5. Submit Contractor's Affidavit of Release of Liens (see attached sample at end of Section).
 6. Submit a final liquidated damages settlement statement, if any.
 7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- B. Reinspection Procedure: The Engineer will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except for items whose completion is delayed under circumstances acceptable to the Engineer.
1. Upon completion of reinspection, the Engineer will prepare a certificate of final acceptance. If the Work is incomplete, the Engineer will advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
 2. If necessary, reinspection will be repeated.

1.5 RECORD DOCUMENT SUBMITTALS

- A. General: Do not use record documents for construction purposes. Protect record documents from deterioration and loss in a secure, fire-resistant location. Provide access to record documents for the Engineer's reference during normal working hours.

- B. Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark which drawing is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
 - 1. Mark record sets with red erasable pencil.
 - a. Show distance between centers of manholes to the nearest tenth of a foot.
 - b. Show centerline invert elevations to the nearest hundredth of a foot.
 - c. Show top elevation of manhole to nearest tenth of a foot.
 - d. Show vent elevation to nearest tenth of a foot.
 - e. Show correct stationing for manholes.
 - f. Show horizontal angles between manholes to the nearest quarter of a minute.
 - 2. Note related change-order numbers where applicable.
 - 3. Organize record drawing sheets into manageable sets. Bind sets with durable-paper cover sheets; print suitable titles, dates, and other identification on the cover of each set.

- C. Record Specifications: Maintain one complete copy of the Project Manual, including addenda. Include with the Project Manual one copy of other written construction documents, such as Change Orders and modifications issued in printed form during construction.
 - 1. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications.
 - 2. Give particular attention to substitutions and selection of options and information on concealed construction that cannot otherwise be readily discerned later by direct observation.
 - 3. Note related record drawing information and Product Data.
 - 4. Upon completion of the Work, submit record Specifications to the Engineer for the Owner's records.

- D. Record Product Data: Maintain one copy of each Product Data submittal. Note related Change Orders and markup of record drawings and Specifications.
 - 1. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site and from the manufacturer's installation instructions and recommendations.
 - 2. Give particular attention to concealed products and portions of the Work that cannot otherwise be readily discerned later by direct observation.

3. Upon completion of markup, submit complete set of record Product Data to the Engineer for the Owner's records.
- E. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record keeping and submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order. Identify miscellaneous records properly and bind or file, ready for continued use and reference. Submit to the Engineer for the Owner's records.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. Remove waste, surplus materials, excess spoil, rubbish, erosion control measures and construction facilities from the site.
- B. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of lawfully.

END OF SECTION 01700

**CONTRACTOR'S
AFFIDAVIT OF PAYMENT
OF DEBITS AND CLAIMS**

OWNER
ENGINEER
CONTRACTOR
SURETY
OTHER

PROJECT: City of Thomasville
Nucor Sanitary Sewer Outfall
Sanitary Sewer Improvements
AWCK Project No. 22087

Agreement Date: _____

TO: City of Thomasville
10 Salem Street
Thomasville, North Carolina 27360

CONTRACTOR: _____

State of: _____

County of: _____

The undersigned, pursuant to the General Conditions of the Construction Contract; hereby certifies that, except as listed below, Contractor has paid in full or has otherwise satisfied all obligations for all materials and equipment furnished, for all work, labor and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Agreement referenced above for which the Owner or his property might in any way be held responsible.

EXCEPTIONS: (If none, write "NONE". If required by the Owner, the Contractor shall furnish bond satisfactory to the Owner for each exception).

SUPPORTING DOCUMENTS ATTACHED
HERETO:

- 1. Consent of Surety to Final Payment
- 2. Contractor's Affidavit of Release of Liens

The following supporting documents should be attached hereto if required by the Owner:

- 1. Contractor's Release of Waiver of Liens, conditional upon receipt of final payment.

CONTRACTOR: _____

Address: _____

BY: _____

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

Notary Public: _____

My Commission Expires: _____

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CONSENT OF SURETY COMPANY TO FINAL PAYMENT

OWNER	<input type="checkbox"/>
ENGINEER	<input type="checkbox"/>
CONTRACTOR	<input type="checkbox"/>
SURETY	<input type="checkbox"/>
OTHER	<input type="checkbox"/>

PROJECT: City of Thomasville Agreement Date: _____
 Nucor Sanitary Sewer Outfall
 Sanitary Sewer Improvements
 AWCK Project No. 22087

TO: City of Thomasville CONTRACTOR: _____
 10 Salem Street
 Thomasville, North Carolina 27360

In accordance with the provisions of the Agreement between the Owner and Contractor as indicated above, the (here insert name and address of Surety Company)

 _____ SURETY COMPANY

on bond of (here insert name and address of Contractor)

 _____ CONTRACTOR

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve the Surety Company of any of its obligations to (here insert name and address of Owner)

 _____ OWNER

as set forth in the said Surety Company's bond.

IN WITNESS WHEREOF,
 the Surety Company has hereunto set its hand this _____ day of _____, 20__

 Surety Company

Attest _____
 (Seal) Signature of Authorized Representative

 Title

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**CONTRACTOR'S
AFFIDAVIT OF
RELEASE OF LIENS**

OWNER
ENGINEER
CONTRACTOR
SURETY
OTHER

PROJECT: City of Thomasville
Nucor Sanitary Sewer Outfall
Sanitary Sewer Improvements
AWCK Project No. 22087

Agreement Date: _____

TO: City of Thomasville
10 Salem Street
Thomasville, North Carolina 27360

CONTRACTOR: _____

State of: _____

County of: _____

The undersigned, pursuant to the General Conditions of the Construction Contract; hereby certifies that to the best of his knowledge, information and belief, except as listed below, the Release or Waivers of Liens attached hereto include the Contractor, all Subcontractors, all suppliers of materials and equipment, and all performers of work, labor or services who have or may have liens against any property of the Owner arising in any manner out of the performance of the Agreement referenced above.

EXCEPTIONS: (If none, write "NONE". If required by the Owner, the Contractor shall furnish bond satisfactory to the Owner for each exception).

SUPPORTING DOCUMENTS ATTACHED
HERETO:

1. Contractor's Release of Waiver of Liens,
conditional upon receipt of final payment.

CONTRACTOR: _____

Address: _____

BY: _____

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

Notary Public: _____

My Commission Expires: _____

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SECTION 01740

WARRANTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.3 WARRANTY REQUIREMENTS

- A. The Contractor shall guarantee that if any materials, equipment or workmanship covered by these specifications and the accompanying drawings proves defective within one (1) year after final acceptance, such defects shall be made good by Contractor without cost to the Owner.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01740

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SECTION 02010

SUBSURFACE INVESTIGATION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Soils investigation report.
 - 1. **No report has been prepared.**
- B. Use of data:
 - 1. Bidders should visit the site and acquaint themselves with existing conditions.
 - 2. Prior to bidding, bidders may make their own surface investigations to satisfy themselves as to site conditions, but such investigations may be performed only under time schedules and arrangements approved in advance by the Engineer.

1.2 QUALITY ASSURANCE

- A. A soil engineer will be retained by the Owner to observe performance of work in connection with excavating, trenching, filling, backfilling, and grading, and to perform compaction tests.
- B. Contractor will be responsible for costs associated with excessive retesting by the Soil Engineer.
- C. Readjust work performed that does not meet technical or design requirements but make no deviation from the Contract Documents without specific and written approval from the Engineer.

END OF SECTION 02010

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SECTION 02230

SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1-16 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:

- 1. Existing Utilities.
- 2. Clearing and grubbing.
- 3. Pavement removal.

- B. Related Sections include the following:

- 1. Division 1 Section "Measurement and Payment" for schedule of unit prices. (N/A)
- 2. Division 1 Section "Construction Facilities and Temporary Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities, and environmental protection measures during site operations.
- 3. Division 2 Section "Trenching for Utilities" for soil materials, excavating, backfilling, trenches and grading the easement areas.
- 4. Division 2 Section "Lawns and Grasses" for finish grading, including placing and preparing topsoil for lawns and planting.
- 5. Division 2 Section "Erosion Control" for temporary erosion control measures.

1.3 MATERIALS OWNERSHIP

- A. Except for materials indicated to be stockpiled or to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from the site.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly flag trees and vegetation to remain.
- C. Protect existing site improvements to remain from damage during construction.

- D. Restore damaged improvements to their original condition, as acceptable to Engineer or Owner of property if damage occurs outside easements shown on drawings.

3.2 EXISTING UTILITIES

- A. The contractor shall be responsible for making a field inspection of existing utilities prior to the bid opening. The Contractor shall be responsible for any damage to existing utilities resulting from his work. Approximate locations are shown on the plan view of each sheet.
- B. The contractor shall excavate and expose all existing underground lines in advance of trenching operations to assure that there will be no conflicts with the proposed grade and alignment. All water and sewer connections damaged during construction shall be repaired by the Contractor.
- C. The contractor shall comply with the Underground Damage Prevention Act, G.S. Chapter 87.

3.3 CLEARING AND GRUBBING

- A. The work of clearing and grubbing shall consist of the cutting, removal and satisfactory disposal of all vegetation and surface debris within the temporary easement as shown on the plans.
 - 1. Trees inside the temporary construction easement but outside the permanent easement will not be required to be removed. The contractor may at his option leave in place a tree which in contractor's opinion will not interfere with trench excavation or backfilling operations. If tree is damaged to an extent as to destroy the value for shade or other landscaping purposes the tree shall be removed and disposed of by contractor without additional compensation, when so directed by the Engineer.
- B. Clearing and grubbing operations shall be completed sufficiently in advance of trenching operations as may be necessary to prevent any of the debris from clearing and grubbing operations from interfering with the trench excavation or backfilling operations.
- C. All work shall be performed in a manner which will cause a minimum of soil erosion. The contractor shall perform such erosion control work, temporary or permanent as may be directed by the Engineer, in order to satisfactorily minimize erosion resulting from clearing and grubbing operations.
- D. The contractor shall conduct his operations in a manner to prevent limb, bark, or root injuries to trees, shrubs, or other types of vegetation that are to remain growing and also to prevent damage to adjacent property. When any such injuries unavoidably occur, all rough edges of scarred areas shall first be made reasonably smooth in accordance with generally accepted horticultural practice, and the scars then thoroughly covered with an asphaltum base tree paint. Any such plants that are damaged by any construction operations to such an extent as to destroy their value for shade or other landscape purposes shall be cut and disposed of by the contractor, without extra compensation, when so directed by the Engineer.
- E. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding 8-inch loose depth and compact each layer to a density equal to adjacent original ground.

3.4 PAVEMENT REMOVAL

- A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. All pavement to be removed shall be marked for cutting by chalk line or other acceptable method. After marking, bituminous pavement shall be cut to its full depth to a neat and true line along the mark. Concrete pavement shall be sawed to a minimum depth necessary for a smooth cut when broken out. Saw-cut faces vertically.
 - 2. The cuts should be the width of the required trench (a minimum width of fifty-four (54") inches, unless otherwise directed by the Engineer) plus one (1) foot of pavement removal on each side of the trench.
 - 3. All pavement cut shall be removed from the site of the work and shall not be used to backfill trenches. Following compaction of the backfill material, ten (10") inches of ABC stone shall be placed and compacted within all excavated areas and brought to an elevation as determined in the field by the Engineer.
 - a. Contractor shall maintain all pavement cuts with ABC stone as necessary until the pavement cut is replaced with pavement.

3.5 DISPOSAL

- A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off Owner's easement.

END OF SECTION 02230

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SECTION 02240

DEWATERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Divisions 1-16 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes construction dewatering.
- B. Related Sections include the following:
 - 1. Division 1 Section "Construction Facilities and Temporary Controls."
 - 2. Division 2 Section "Trenching for Utilities" for excavating, backfilling, and site grading.
 - 3. Division 2 Section "Excavation Support and Protection."

1.3 PERFORMANCE REQUIREMENTS

- A. Dewatering Performance: Design, provide, test, operate, monitor, and maintain a dewatering system of sufficient scope, size, and capacity to control ground-water flow into excavations and permit construction to proceed on dry, stable subgrades.
 - 1. Work includes removing dewatering system when no longer needed.
 - 2. Maintain dewatering operations to ensure erosion is controlled, stability of excavations and constructed slopes is maintained, and flooding of excavation and damage to structures are prevented.
 - 3. Prevent surface water from entering excavations by grading, dikes, or other means.
 - 4. Accomplish dewatering without damaging existing buildings adjacent to excavation.

1.4 PROJECT CONDITIONS

- A. Regulatory Requirements: Comply with water disposal requirements of authorities having jurisdiction.
- B. Existing Utilities: Do not interrupt utilities serving facilities occupied by the Owner or others unless permitted in writing by the Engineer and then only after arranging to provide temporary utility services according to requirements indicated.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
 - 1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
 - 2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.
- B. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

3.2 DEWATERING

- A. Provide an adequate system to lower and control ground water to permit excavation, pipe installation, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of sewers, and other excavations.
 - 1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.
- B. Dispose of water removed from excavations in a manner to avoid endangering public health, property, and portions of work under construction or completed. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.
- C. Damages: Promptly repair damages to adjacent facilities caused by dewatering operations.

END OF SECTION 02240

SECTION 02260

EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1-16 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes excavation support and protection systems.
- B. Related Sections include the following:
 - 1. Division 1 Section "Construction Facilities and Temporary Controls."
 - 2. Division 2 Section "Trenching for Utilities" for excavating and backfilling.

1.3 PERFORMANCE REQUIREMENTS

- A. Design, provide, monitor, and maintain an anchored and braced excavation support and protection system capable of resisting soil and hydrostatic pressure and supporting sidewalls of excavations.
 - 1. Work includes removing excavation support and protection systems when no longer needed.
 - 2. Prevent surface water from entering excavations by grading, dikes, or other means.
 - 3. Install excavation support and protection systems without damaging existing buildings, pavements, and other improvements adjacent to excavation.

1.4 SUBMITTALS

- A. Shop Drawings: Any excavation support and protection system for excavations which exceed Fifteen (15') feet in depth, or any other shoring specifically required to be designed by a professional engineer, shall be prepared by or under the supervision of a qualified professional engineer. System design and calculations must be acceptable to authorities having jurisdiction.

1.5 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by the Owner or others unless permitted in writing by the Engineer and then only after arranging to provide temporary utility services according to requirements indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials need not be new but must be in serviceable condition.

- B. Structural Steel: ASTM A 36 (ASTM A 36M).
- C. Steel Sheet Piling: ASTM A 328 (ASTM A 328M) or ASTM A 572 (ASTM A 572M)
- D. Wood Lagging: Lumber, mixed hardwood, nominal rough thickness of 3 inches.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.
 - 1. Shore, support, and protect utilities encountered.
- B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
- C. Locate excavation support and protection systems clear of permanent construction and to permit forming and finishing of concrete surfaces.
- D. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure excavation support and protection systems remain stable.
- E. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

3.2 REMOVAL AND REPAIRS

- A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and bear soil and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils and damaging structures, pavements, facilities, and utilities.
 - 1. Remove excavation support and protection systems to a minimum depth of 48 inches below overlying construction and abandon remainder.
 - 2. Repair or replace, as approved by Engineer, adjacent work damaged or displaced by removing excavation support and protection systems.

END OF SECTION 02260

SECTION 02300

UTILITY HORIZONTAL DIRECTIONAL DRILLING (HDD)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplementary Conditions and Division 1-16 Specifications Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for completing installation of sanitary sewer forcemain using Horizontal Directional Drilling (HDD) construction methods, including:
 - 1. Design, furnish and install the proposed piping alignment by horizontal directional drilling (HDD) construction methods, as shown on the drawings and in conformance with this specification. The work includes, but is not limited to, survey, design, excavation, dewatering, removal of all materials encountered in the horizontal directional drilling operations, disposal of all material not required in the work, testing, cleaning, restoration, and incidentals as shown on the drawings and as specified herein.
 - 2. The HDD method shall consist of directing a string of small pipe, known as a drill string, along a pre-determined profile to drill a pilot hole, enlarge the pilot hole, and pull the pipe into place. In general, the process uses a machine to rotate, advance and retract the drill string; a cutterhead for drilling the pilot hole; a back reamer to enlarge the pilot hole to the required diameter; a pulling head and bearing swivel to pull the pipe into place; a drill string head locating and guidance system; and drilling fluid to provide lubrication, remove the cuttings and spoil and maintain the integrity of the hole. The operations are to be completed while simultaneously providing ground stabilization techniques. The method shall include provisions for preventing uncontrolled inflow of loose or saturated soils.
 - 3. Contractor is responsible for completing any additional geotechnical/subsurface investigations required to identify and confirm the location of existing utilities along the proposed HDD alignment, and establish the appropriate parameters (i.e., limiting pressures, setback distances, depth of cover, etc.) for completing the design of the alignment, prior to the start of construction.
- B. Related Sections include the following:
 - 1. Division 1 Section "Measurement and Payment" for a schedule of unit prices.
 - 2. Division 2 Section "Dewatering" for lowering and disposing of ground water during construction.
 - 3. Division 2 Section "Excavation Support and Protection".
 - 4. Division 2 "Trenching for Utilities".

1.3 REFERENCES

A. Standards referenced in this Section are:

1. NUCA, HDD Installation Guidelines.
2. American Railway Engineering Association: Specifications, Part 5; Pipeline – Crossings Under Tracks or Located on Railroad Property – For Flammable and Nonflammable Substances.
3. ASTM F1962: Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit Under Obstacles, Including River Crossings

1.4 SUBMITTALS

A. The Contractor must submit a Work Plan to the Engineer at least 20 days prior to start of HDD detailing the procedure and schedule to be used to execute the Project. The Work plan should include:

1. Statement of contractor qualifications meeting the following requirements:
 - a. Minimum work experience – 3 years
 - b. Minimum machine capability – 24,000 LB thrust
 - c. SDS & Safety Program must be specific to HDD work
2. HDD Operation Plan which shall include:
 - a. Material and equipment list: Submittal shall include detail information on drill rig, pilot tube, slurry treatment plants, drill path monitoring system, pipes, fittings, and drilling fluids.
 - b. Detailed information on tracking/steering tools and surface monitoring system, including detail plan and procedure on calculating and correcting drill path and azimuth.
 - c. Drilling fluids: Submittal shall include mix designs, QA/QC procedures, and criteria for mud rejection based on anticipated ground behavior and HDD operation requirements. The Contractor shall verify ground conditions prior to planning and designing drill fluids with the information contained in the report.
 - d. Construction schedule.
 - e. Documentation showing proper calibration of all measuring or monitoring devices including, but not limited to, pressure gauges, flow meter, load cells, steering/tracking devices.
 - f. Site layout plan for rig side and pipe lay-down area, including list of equipment to be used.
 - g. Shop drawing for the breakaway swivel, including set up detail in accordance to pipe manufacturer's setting for recommended pullback force.
3. Boring Plan which shall include:
 - a. Detail description and sequence of the work plan for the entire HOD operation, including entry and exit point site preparation and restoration.
 - b. The anticipated number of reams and detail information of each reamer to be used.
 - c. Detail on drill rig, pilot hole, and steering/tracking system to be used, including rig pulling capacity and torque.
 - d. Drilling rod length in feet.
 - e. The anticipated drill rate for pilot tube boring, reaming, and pipe pull back, including correction plan for buoyancy.
 - f. Drilling fluid pumping capacity.

- g. Details of pipe fusion methodology.
 - h. Drill mud mixing and treatment procedure.
 - i. Borehole cuttings handling and disposal procedure.
 - j. Plans for protection of existing utilities or facilities.
 - k. Pipe assembly procedure on pipe lay-down area, including pipe support method and design to optimize pipe pull-back operation and prevent excessive sagging of pipes.
 - l. Calculation showing the maximum anticipated pullback load and stress on pipe during pull-back. The calculation shall be prepared and certified by a registered Professional Engineer in the State of North Carolina.
 - m. Calculation of anticipated maximum and optimum drill mud pressure during the entire HDD operation. The calculation shall be prepared and certified by a registered Professional Engineer in the State of North Carolina.
 - n. Contingency plan for mud frac-out, excessive settlement or heaving, major equipment failure, any other unanticipated advertent situations, and situations from unexpected ground conditions e.g. boulders or artesian condition.
 - o. Daily report providing the details of monitoring to include, but not limited to the following:
 - i. Pilot hole data showing pilot hole and its deviation from the original path.
 - ii. Steering data showing progress made every day.
 - iii. A summary report or graphic showing desired and true alignments.
 - p. Daily progress report, including advance rate, quantity of material used, observed pull-back load, and drilling fluid pressure.
 - q. Plan for containment of residuals and water for installation of sewer force mains.
 - r. Procedures including, but not limited to, monitoring for gases encountered shall be submitted.
 - s. Hazardous chemical list as well as all MSDS and technical data sheets.
- B. Contractor must demonstrate expertise in "trenchless" methods by providing a list of five (5) utility references for which similar work has been performed in the last two years. The references should include a name and telephone number where contact can be made to verify the Contractor's capability. The Contractor must provide documentation showing successful completion of the projects used for reference. Conventional trenching experience will NOT be considered applicable.
- C. Contractor must have completed HDD pipe installations of same size diameter or larger and have successfully completed lengths as shown on drawings or longer, crossings of railroads, major state roads, or bodies of water. Provide documentation in qualification submittal.
- D. Contractor is required to bring to the attention of the Engineer any known discrepancies with actual HDD methods that the Contractor will be performing. This shall be stated, in writing, to Engineer no later than the pre-construction meeting.
- E. Submit daily reports to the Engineer, following completion of the pilot bore hole, separately for each HDD operation. At minimum, the report shall include the following:
- 1. Project information
 - 2. Name of data collector
 - 3. Site photos during operation
 - 4. Steering and tracking data log
 - 5. Deviations between the desired and the true alignments

- F. Submit a separate Bore Path Report to the Engineer within seven days upon completion of each HDD operation. At a minimum, the report shall include the operation. At minimum, the report shall include the following:
 - 1. Project information
 - 2. Name of data collector
 - 3. Site photos during operation
 - 4. Date wise steering and tracking data log, including summary of desired and true alignments. Include horizontal and vertical alignments. Collected data points shall be provided in MS Excel format.
 - 5. Record drawings of the installed pipeline, including plan and profile of theoretical alignment
 - 6. Observed pullback force (pound-force) vs. pipeline in borehole (feet), data recorded at 5-ft intervals.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the site to ensure uninterrupted progress of the Work.
- B. Handle all pipe, fittings, specials and accessories carefully with approved handling devices. Handling devices shall include ropes, fabric, or rubber-protected slings and straps. Chains, cables, or hooks inserted into the pipe ends shall not be used. Two slings spread apart shall be used for lifting each length of pipe. Do not drop or roll material off trucks.
- C. Store pipes and fittings on heavy wood blocking or platforms so they are not in contact with the ground. Pipe supports shall be spaced suitably and of such widths as not to allow deformation of the pipe at the point of contact with the supports.
- D. Stacking of pipe shall be limited to a height that will not cause deformation of the bottom pipes under anticipated temperature conditions.
- E. All ends of stored piping shall be securely capped/plugged to prevent entry of debris.

1.6 MISCELLANEOUS

- A. All pipes and fittings shall be designed and provided by a single manufacturer to maximize reliability and compatibility. The drilling supervisor must be adequately trained to operate the specific equipment to be used on the project and will have at least ten years of experience in HDD operations. The supervisor shall remain on the project site during the entirety of the HDD program. Contractor shall submit the names and resumes of all supervisory field personnel to the Engineer for review and approval prior to the start of construction.
- B. Pipe fusion shall be performed by qualified and trained personnel or agency that is certified by the pipe manufacturer. Qualifications of the HDD pipe fuser shall be submitted and subject to review and approval by the Engineer.
- C. The qualifications of the drilling fluid specialist and drill path tracking specialist shall be submitted to the Engineer for review and approval. Work being performed within the North Carolina Department of Transportation's (NCDOT) right-of-way shall be done in accordance with the latest NCDOT Standard Specifications and Drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. See specification section 02540 for HDPE pipe specifications.
- B. Trace wire shall be 12-gauge, solid copper trace wire with green thermoplastic insulation.

2.2 EQUIPMENT

A. General

- 1. The directional drilling equipment, as a minimum, shall consist of a directional drilling rig of sufficient capacity to perform the bore(s) and pull-back of the pipe(s), a drilling fluid mixing & delivery system of sufficient capacity to successfully complete the crossing, a guidance system to accurately guide boring operations, and trained and competent personnel to operate the system. All equipment shall be in good, safe operating condition with sufficient supplies, materials and spare parts on hand to maintain the system in good working order for the duration of this project. All required equipment shall be included in the contingency plan as submitted per these specifications. Incidental materials that may or may not be used to install the product depending on field requirements are not paid for separately and will be included in the cost of the installed product.

B. Drilling Rig

- 1. The directional drilling machine shall consist of a hydraulically powered system to rotate, push and pull drill pipe while delivering a pressurized fluid mixture to a drill head. The machine shall be anchored to withstand the pulling, pushing and rotating forces required to complete the project.
- 2. The drilling rig hydraulic system shall be of sufficient pressure and volume to power drilling operations. The hydraulic system shall be free from leaks.
- 3. The drilling rig shall have a system to monitor pull-back hydraulic pressure during pull-back operations.

C. Drill Head

- 1. The horizontal directional drilling equipment shall produce a stable fluid lined tunnel with the use of a steerable drill head and any subsequent pre-reaming heads.
- 2. The system must be able to control the depth and direction of the drilling operation.
- 3. Drill head shall contain all necessary cutters and fluid jets for the operation and shall be of the appropriate design for the ground medium being drilled.

D. Drilling Fluid System

- 1. Drilling Fluid (Drilling Mud)
 - a. Drilling fluid shall be composed of clean water and the appropriate additive(s) for the fluid to be used. Water shall be from a clean source and shall meet the mixing requirements of the mixture manufacturer(s). The water and additives shall be mixed thoroughly to assure the absence of any clumps or clods. No hazardous additives may be used.

- b. Drilling fluid shall be maintained at a viscosity sufficient to suspend cuttings and maintain the integrity of bore wall(s), while minimizing the likelihood of ground fracture causing frac-out. The Contractor shall be able to modify the mix design for anticipated ground conditions. Only environmentally compatible or bio-degradable mix designs are to be used. No additional chemicals or polymer surfactants shall be allowed to be added to the drilling fluid unless they have been submitted per this specification.
 - c. The density, viscosity, pH value, circulation, volume, and solid content of the fluid are to be tested and considered to assure compatibility between the drilling fluid mixture and native soil after proper identification and characterization.
 - d. Drilling fluid shall be disposed of off-site in accordance with local, state and federal requirements and/or permit conditions.
2. Mixing System
- a. A drilling fluid mixing system shall be of sufficient size to mix and deliver drilling fluid for the project.
 - b. The mixing system shall be able to ensure thorough mixing of the drilling fluid. The drilling fluid reservoir tank shall be sized for adequate storage of the fluid.
 - c. The mixing system shall continually agitate the drilling fluid during drilling operations.
3. Drilling Fluid Delivery and Recovery System
- a. The drilling fluid pumping system shall have a minimum capacity to supply drilling fluid in accordance with the drilling equipment pull-back rating at a constant required pressure.
 - b. The delivery system shall have filters or other appropriate in-line equipment to prevent solids from being pumped into the drill pipe.
 - c. Used drilling fluid and drilling fluid spilled during drilling operations shall be contained and properly disposed of. The use of spill containment measures shall be maintained around drill rigs, drilling fluid mixing system, entry and exit pits and drilling fluid recycling system (if used) to prevent spills into the surrounding environment. Pumps, vacuum truck(s), and/or storage of sufficient size shall be in place to contain excess drilling fluid.
 - d. A closed-loop drilling fluid system and a drilling fluid cleaning system should be used to whatever extent practical, depending upon project size and conditions. Under no circumstances shall drilling fluid that has escaped containment be reused in the drilling system.

E. Drilling Control System

1. Calibration of the electronic detection and control system shall be verified prior to the start of the bore.
2. The drilling head shall be remotely steerable by means of an electronic or magnetic detection system and be able to control depth and direction of the pipe accurate to a window of ± 2 inches. The steering and tracking system must provide the following information, and shall be calibrated before use:
 - a. Roll and pitch angles
 - b. Depth and length
 - c. Transmitter temperature
 - d. Battery status
 - e. Coordinates
 - f. Azimuth

- g. Correction for azimuth
- 3. Point of rotation of the head shall also be monitored.
- 4. Horizontal and vertical alignment shall be plotted at 10-ft intervals.
- 5. Borehole alignment tolerance:
 - a. Vertical:
 - i. Minimum separation between existing utilities and proposed HDPE forcmain must be met
 - ii. 2.0 feet in 100 linear feet
 - iii. No reverse curvature
 - iv. Total deviation not to exceed 5.0 feet
 - b. Horizontal:
 - i. 2.0 feet in 200 linear feet
 - ii. No reverse curvature
 - iii. Total deviation not to exceed 7.0 feet

F. Pipe Pull Heads

- 1. Pipe pull heads shall be utilized that employ a positive through-bolt design assuring a smooth wall against the pipe cross-section at all times.
- 2. Pipe pull heads shall be specifically designed for use with the various types of pipe and shall be as recommended by the pipe supplier.
- 3. Pipe pull heads shall be equipped with a data logger to record pipe pullback force vs. pipe length during all pipe installations.

G. Pipe Rollers

- 1. Pipe rollers, if required, shall be of sufficient size to fully support the weight of the pipe during handling and pullback operations.
- 2. A sufficient quantity of rollers and spacing, per the pipe supplier's guidelines shall be used to assure adequate support and excessive sagging of the product pipe.

H. Tracer Wire

- 1. Two tracer wires shall be installed and taped to the drill host pipe at 10' intervals.

PART 3 - EXECUTION

3.1 PROTECTION OF EXISTING UTILITIES

- A. Locate and protect all existing overhead and underground utilities.

3.2 INSTALLATION

- A. The Contractor shall notify the Engineer at least three (3) working days prior to start of construction. Drilling or installation work shall not begin until the Engineer or Engineer's Representative is present at the job site and agrees that prior preparations for the operation have been made.
- B. Contractor shall:
 - 1. Be responsible for carrying out all HDD work in strict conformance to the requirements specified in the contract drawings, specifications, and permits from all applicable agencies.

This includes being in compliance with the lawful requirements and permits of the NCDOT, public agencies, and owners of public utilities or other facilities respecting the safeguarding of structures, air, ground, water, and other improvements that might be endangered by the HDD.

2. All personnel shall be fully trained in safety according to OSHA 1926 and equipped in their respective responsibilities.
3. Perform the HDD simultaneously and continuously until the pipe is in final position.
4. Be responsible for means and methods of HDD, and shall ensure the safety of the Work, the Contractor's employees, the public, and adjacent property, whether public or private.
5. Maintain traffic flow at all times during the progress of the Work. Provide adequate signs, barricades, flag persons, lights and other control devices in accordance with the provisions and requirements of the NCDOT standards. No lanes of traffic shall be closed without prior approval.
6. Provide erosion and sediment control to minimize erosion and the transport of sediment beyond the limits of the work area.
7. Anticipate that portions of the HDD will be below the groundwater table and dewatering will be required.
8. Verify site conditions and access prior to any preparation or mobilization work to ensure on-time and prior delivery of pipes, material and equipment. Work performed for such purposes shall be incidental to the Work.
9. Request instructions from Engineer in writing, before proceeding, if there is a conflict between manufacturer's recommendations and the Drawings or Specifications.
10. Be responsible for all testing, survey, and documentation of the pre/post construction site conditions, to provide as a basis of comparison for the post construction conditions to be evaluated.
11. Carry out excavation for entry, exist, recovery pits, slurry sump pits, or any other excavation as specified in the Contract documents. Drill mud shall be contained in the sump pit and hauled offsite.
12. Provide all necessary adapters, specials and connection pieces required when connecting different types and sizes of pipe or connecting pipe made by different manufacturers.

C. HDD Operations:

1. Pilot Hole Bore:
 - a. Pilot hole shall be drilled along bore path. In the event that the pilot bore does deviate from the bore path, it may require Contractor to pull-back and re-drill from the location along bore path before the deviation.
 - i. For mains, pilot hole shall have a tolerance of +2 feet horizontal and vertical along bore path, but in no case, shall depth of bury be less than the minimum specified.
 - ii. Determine and document cutterhead location every 25 feet.
 - b. The Contractor shall limit curvature in any direction to reduce force on the pipe during pull-back. The minimum radius of curvature shall be no less than that specified by the pipe supplier and as indicated on the drawings.
2. Reaming:
 - a. After successfully completing the pilot hole, the bore hole shall be reamed to a diameter which meets the requirements of the pipe being installed.
 - b. Perform pre-reaming operations as necessary for proper pipe installation.
 - c. In the event of a drilling fluid fracture, returns loss or other loss of drilling fluid, the Contractor shall be responsible for restoring any damaged property to original condition and cleaning up the area in the vicinity of the damage or loss.

3. Pipe Pull-Back and Insertion:
 - a. Pipe shall be fused prior to insertion, if the site and conditions allow, into one continuous length.
 - b. Contractor shall handle the pipe in a manner that will not over-stress the pipe prior to insertion. Vertical and horizontal curves shall be limited so that the pipe does not bend past the pipe supplier's minimum allowable bend radius, buckle, or otherwise become damaged. Damaged portions of the pipe shall be removed and replaced.
 - c. The pipe entry area shall be graded as needed to provide support for the pipe and to allow free movement into the bore hole.
 - i. The pipe shall be guided into the bore hole to avoid deformation of, or damage to, the pipe.
 - ii. The pipe may be continuously or partially supported on rollers or other Owner and Engineer approved friction decreasing implement during joining and insertion, as long as the pipe is not over-stressed or critically abraded prior to, or during installation.
 - iii. A swivel shall be used between the reaming head and the pipe to minimize torsional stress on the pipe assembly.
 - d. Contractor to monitor and control the pressure/force applied to ensure that pipe manufacturer's recommended limits are not exceeded.
 - e. Once pull-back operations have commenced, the operation shall continue without interruption until the pipe is completely pulled through the bore hole.
 - f. Removal of soil cuttings and pull back shall be closely monitored to minimize frac-out and ground surface movement. Any damages caused by the Contractor's operations shall be corrected by the Contractor.

4. Slurry Removal and Disposal:
 - a. Handling and disposal of soil cuttings shall be in accordance with regulations of the state and local government agencies, permit requirements, and Contractor's approved plan.
 - b. Contain excess drilling fluids at entry and exit points until recycled or removed from site. Provide recovery system to remove drilling spoils from access pits.
 - i. Remove, transport and legally dispose of drilling spoils off site. Do not discharge drilling spoils in sanitary sewers, storm sewers, or other drainage systems. When drilling in suspected contaminated soil, test drilling fluid for contamination before disposal.
 - ii. When drilling fluid leaks to surface, immediately contain leak and barricade area from vehicular and pedestrian travel before resuming drilling operations.
 - iii. Complete cleanup of drilling fluid at end of each work day.

3.3 FIELD QUALITY CONTROL

- A. Furnish, operate and maintain instrumentation that will accurately locate the pilot hole, measure drilling fluid flow discharge rate and pressure, and measure stresses on pipe during installation.
- B. Engineer shall have access to instruments, gages, and readings at all times.
- C. Maintain drilling logs including dates, times and locations, soil condition, drilling data such as depth, angle and rate of penetration, and utility crossings.
- D. Monitor and record use of drilling fluid.
- E. Monitor and record stresses imposed on pipe during pulling.

3.4 TESTING OF PIPING

- A. Perform pressure test in accordance with Specification Section 02540 requirements.
- B. Prior to pullback, perform an allowable leakage test on the full length of pipe after all sections have been welded or fused.

3.5 SITE RESTORATION

- A. Any damage or detrimental consequences resulting from ground heaving, subsidence, frac-out, structural or support failure, or excessive loss of water in relation to HDD or other works by the Contractor shall be repaired at no additional cost to the Owner.
- B. Plan for restoration and repair shall be in accordance with the approved submittal. Remediation plan and documentation of the repair and restoration works process shall be completed and submitted for record to the Engineer.
- C. Following drilling operations, Contractor will demobilize equipment and restore the work-site to its pre-construction condition. Any noticeable surface defects due to the drilling operation shall be repaired by Contractor.

3.6 WORK REJECTION

- A. The following comprise conditions under which work shall be rejected:
 - 1. When there is any indication that the installed product has sustained damage, stop all work and notify the Engineer immediately. As part of the investigative measure to determine extent of the damage, the pressure and I or mandrel test shall be carried out as directed by the Engineer at no additional cost to the Owner. Perform all testing within 24 hours unless otherwise directed by the Engineer. Furnish a copy of all test results and bore logs to the Engineer for review and determination of conformance of installed product to specifications and performance requirements.
 - 2. If an obstruction is encountered during boring, reaming or pullback, which prevents forward progress of the installation.
 - 3. If the pipe shall fail hydraulic pressure testing in accordance with Specification Section 02540 requirements.
 - 4. Any other defect in material or workmanship which would affect the performance or design life of the installed pipeline.

3.7 RECORD KEEPING

- A. Contractor shall maintain a daily project log of drilling operations and a guidance system log with a copy given to Engineer at completion of boring. Record drawings shall be certified as to accuracy by Contractor as required in contract documents.

END OF SECTION 02300

SECTION 02321

TRENCHING AND EXCAVATING FOR UTILITIES AND STRUCTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1-16 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes excavating and backfilling for trenches and/or structures.
- B. Related Sections include the following:
 - 1. Division 1 Section "Measurement and Payment" for a schedule of unit prices.
 - 2. Division 1 Section "Construction Facilities and Temporary Controls."
 - 3. Division 2 Section "Excavation Support and Protection."
 - 4. Division 2 Section "Rock Excavation" for removal of rock and backfilling trench.
 - 5. Division 2 Section "Lawns and Grasses" for seeding and mulching disturbed areas.

1.3 DEFINITIONS

- A. Backfill: Soil materials used to fill an excavation.
 - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe, or beside a structure to 3 ft. above bottom of excavation.
 - 2. Final Backfill: Backfill placed over initial backfill to fill a trench or pit.
- B. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.
- C. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.
- D. Classification of Excavated Materials: No classifications of excavated materials will be made except for Rock Excavation as defined in Division 2 of these specifications. Excavation and trenching work shall include the removal and subsequent handling of all materials excavated or otherwise removed in the performance of the contract work, regardless of the type, character, composition, or condition thereof.
- E. Fill: Soil materials used to raise existing grades.

1.4 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Engineer and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Engineer not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Engineer's written permission.
 - 3. Contact utility-locator service for area where Project is located before excavating.
- B. Traffic: Do not interfere with or close public or private roadways or driveways without permission of governing authorities. Work within the rights-of-way of public roadways shall be done in accordance with requirements and provisions of the permits issued by the agencies for the construction within their respective rights-of-way.
- C. If materials are encountered that are suspected of being hazardous or toxic, the Contractor shall notify the Engineer immediately. If hazardous or toxic materials are present, the Engineer will issue a work change directive in accordance with Division 1 "Modification Procedure".

PART 2 - PRODUCTS

2.1 FILL MATERIALS

- A. Earth Backfill: Excavated earth material free of cinders, frozen materials, ashes, refuse, boulders, rocks or organic materials. Rocks three (3") inches or larger shall be excluded from the backfill for at least three (3') feet above the top of pipe. Boulders and stone with a dimension of eight (8") inches shall be excluded from all backfill.
- B. Granular Backfill: Gravel or crushed stone meeting the requirements of Section 1005 of the North Carolina Department of Transportation Standard Specifications for Roads and Structures, latest edition. Standard size shall be #67 unless otherwise noted on the plans or contract documents.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by trenching operations.
- B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways. Comply with approved erosion control plan and make necessary repairs, corrections, etc. within 5 days after each rainfall event. Should the site come under any order of the Land Quality Section, the contractor shall take all immediate efforts to put the site into full compliance within the time period specified in such order.
- C. Provide barricades, warning signs, and warning lights around open excavations as necessary to prevent injury to persons.

- D. The Contractor is solely responsible for determining the potential for injury to persons and damage to property and for executing the work to prevent injury and damage.
- E. Do not allow excavation subgrades and soil to be subjected to freezing temperatures, frost or excessive water.

3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding within easement limits, and from flooding project site and surrounding areas.
- B. Protect work area from softening, undermining, washout, and damage by rain or water accumulation.
 - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
 - 2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.
- C. If trench bottom soils are disturbed or loosened by the upward seepage of water or an uncontrolled flow of water, the affected areas shall be excavated and replaced with stabilization stone. No separate payment will be made for stabilization stone.
- D. Water shall be disposed of in a manner as not to be a menace to the public health and in accordance with applicable local regulations and State Environmental Protection Division standards and permits.

3.3 EXPLOSIVES

- A. Explosives: The Contractor shall assume sole responsibility for the effects of explosives and comply with the requirements of "Rock Excavation" of these specifications.

3.4 EXCAVATION, GENERAL

- A. General: Excavation includes the removal of any materials necessary to achieve the required elevations and includes:
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
 - 2. Unnecessary Excavation: The expense of materials outside of limits indicated shall be borne by the Contractor.
 - 3. Approval of Subgrade: The adequacy of the subgrade shall be subject to the inspection and approval of the Engineer before installation of the pipeline or structures.

3.5 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

3.6 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
- B. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
 1. Clearance: 12 inches on each side of pipe or conduit.
- C. Trench Bottoms: Excavate trenches 6 inches deeper than bottom of pipe elevation to allow for bedding course. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade. Hand excavate for bell of pipe.
 1. Unsuitable Subgrade: Where unsuitable materials are encountered below the excavation limits, they shall be removed and disposed of to the level of suitable material. Areas so excavated shall be backfilled with stabilization stone.
 2. Trench Length: The Contractor shall not have in excess of two hundred (200') feet of open trench at any one time.

3.7 STORAGE OF SOIL MATERIALS

- A. Contractor may stockpile excess backfill material in areas acceptable to the engineer and Contractor provided stockpile has adequate erosion control devices to prevent off-site sedimentation. The stockpile is to be located such that surface water will drain away from stockpile. Contractor shall be responsible for removing any excess soil from stockpile not incorporated into the project. If soil is placed on pavement, provide 2" of rock dust over pavement prior to placing soil. No additional payment will be made for this material.

3.8 UTILITY TRENCH BACKFILL

- A. Place and compact bedding course on trench bottoms. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- B. After the pipe is installed, granular backfill shall be placed evenly and carefully around and over the pipe to assure that backfill material is distributed properly and to maintain the proper grade and alignment. The remainder of the trench shall be backfilled with suitable excavated earth material. Rocks three (3") inches or larger shall be excluded from backfill for at least three (3') feet above the top of pipe. Boulders and stone with dimensions greater than eight (8") inches shall be excluded from the backfill.
- C. Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.
- D. Place and compact final backfill of satisfactory soil material to match existing grade on either side of trench.

3.9 COMPACTION OF BACKFILLS AND FILLS

- A. Place backfill and fill materials in uniform layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
 - 1. Outfalls: Twelve (12") inches of pipe subgrade and subsequent lifts: 90 percent.
 - 2. Sidewalk areas and road shoulders: Twelve (12") inches of pipe subgrade and subsequent lifts: 95 percent.
 - 3. All other paved areas and around structures: Twelve (12") inches of pipe/structure subgrade and subsequent lifts: 98 percent.
- C. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within ± 3 percent of optimum moisture content in sidewalk and all other paved areas.
- D. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

3.10 GRADING

- A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes and to prevent ponding. Comply with compaction requirements and grade to provide a smooth transition between adjacent existing grades.

3.11 FIELD QUALITY CONTROL

- A. The Contractor will contract a Geotechnical Engineer to test per Town specifications, or per the below requirements, whichever is more stringent.
- B. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
 - 1. Paved Areas or around structures: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area, but in no case fewer than three tests.
 - 2. Trench Backfill: At each compacted initial and final backfill layer, at least one test for each 500 feet or less of trench length, but no fewer than two tests.

3.12 PROTECTION AND MAINTENANCE

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace soil material to depth as directed by Engineer; reshape and recompact.

- C. Where settling occurs before Project warranty period elapses, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.13 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's easement.
- B. Contractor shall dispose of excess waste material to a site having an approved erosion control plan and current permit from either a local agency having jurisdiction or from NCDENR, Land Quality Section. If site does not have an approved plan and current permit, then Contractor shall be responsible for preparing plan and obtaining permit. Payment of any fees will be paid by the Contractor.

END OF SECTION 02321

SECTION 02322

ROCK EXCAVATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1-16 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the drilling, blasting, excavating, removing and disposing of rock from trenches or pits and includes the backfill replacement material.
- B. Related Sections include the following:
 - 1. Division 1 Section "Measurement and Payment" for schedule of unit prices.
 - 2. Division 2 Section "Trenching and Excavating for Utilities and Structures" for excavating, backfilling and shaping.
 - 3. Division 2 Section "Excavation Support and Protection."

1.3 DEFINITIONS

- A. Rock Excavation: Solid, ledge rock in place which in the opinion of the Engineer, cannot be removed practically without the use of drilling and blasting.
 - 1. Rock excavation includes removal and disposal of solid rock, boulders over 1/2 cu. yd., ledge rock, rock-hard cementitious deposits and other materials or obstructions which cannot be dislodged and excavated with modern, heavy-duty, track-mounting excavating equipment defined as follows:
 - a. For trenches less than 10' in width or pits in excess of 20' in either length or width: Caterpillar Model 320 or equivalent hydraulic excavator.
 - b. Materials which can be removed with the above specified equipment will not be considered as rock and no extra payment will be allowed for such removal.
- B. Replacement Material: Soil material to be used to replace excavated rock material.
 - 1. Material stockpiled from utility trench operations suitable for use as backfill material.
 - 2. Satisfactory soil material imported from off-site for use as backfill material.

1.4 PROJECT CONDITIONS

- A. The Contractor will select an independent, qualified blasting consultant to inspect the blast site and any structures within a 1,000-foot radius of the blasting location. The consultant shall provide sufficient written and photographic documentation to accurately reflect the pre-blast condition of the structure.

- B. Provide vibration-recording instruments to record peak particle velocity (2.0 inches per second maximum allowable), air overpressure (133 decibels maximum allowable) and frequency (15-hertz minimum allowable).
- C. A post-blast inspection shall be performed upon the completion of blasting.

1.5 CONSTRUCTION REQUIREMENTS

- A. The Contractor shall obtain a blasting permit, prior to performing any blasting operations.
- B. The approval of the Engineer shall be obtained before any blasting of rock takes place. The Engineer may fix the hours of blasting if he deems it necessary. The Contractor shall conduct a pre-blast survey and provide the report to the City of Thomasville and the Engineer.
- C. All applicable Federal, State, and Local regulations pertaining to transporting, storing, and using explosives shall be met.
- D. The Contractor shall take all necessary precautions to protect life and property while engaged in blasting operations. Where there exists the danger of rock or overburden being thrown by a blast, an approved type of blasting mat shall be used. The Engineer will approve the blasting mat for type of construction but not for adequacy. No blasting will be allowed unless a galvanometer is used to check cap circuits.
- E. The blasting consultant shall provide vibration recording instruments for use on the initial shots and any other places within one thousand feet (1,000') of a utility, structure, or property which could be damaged by vibration, concussion, or falling rock, the Contractor shall be required to keep a blasting log containing the items listed in Item "G" below in order to determine/verify proper blasting procedures. The Contractor shall provide the Engineer a copy of the monitoring report for the Engineer's file. These instruments shall be of the type which records on direct reading tape the three components of velocity.
- F. Overpressure (concussion) shall be recorded on direct recording tape on equipment specifically designed for impact-type overpressure from blasting.
- G. The blasting consultant shall maintain an accurate log of each shot, listing as a minimum the following data:
 - 1. Date.
 - 2. Time.
 - 3. Weather conditions including temperature and humidity.
 - 4. Station number or other reference to base line survey data.
 - 5. Manufacturer and type of explosive.
 - 6. Method of detonation.
 - 7. Total weight of explosive per shot.
 - 8. Number of delays.
 - 9. Number of holes.
 - 10. Hole depth.
 - 11. Depth to surface of rock (if unexposed during drilling).
 - 12. Amount of explosive per hole number.
 - 13. Total weight of explosive per delay.
 - 14. Amount of stemming.
 - 15. Type and amount of blast matting.
 - 16. A sketch of the hole pattern, with hole numbers for each shot.

- H. This blasting log shall be made available to the Engineer upon request and shall be kept in an orderly manner. Compliance of the contractor with these specifications does in no way relieve him of legal liabilities relative to blasting operation. All blasting operations will be conducted in strict accordance with existing ordinances and accepted safe practices relative to the storage and use of explosives.
- I. All blasting operations will be conducted in such a manner to control the effect on the surrounding area. The following limits will be used for all blasting:
 - Maximum Allowable Peak Particle Velocity: 2.0 inches per second
 - Maximum Allowable Air Overpressure: 133 decibels
 - Minimum Allowable Frequency: 15 hertz

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 TRENCH OR PIT WIDTH

- A. Pipe or structure clearance in rock shall be a minimum of 6 inches below the grade line of the pipe or structure and 12 inches on each side of the nominal diameter of the pipe or structure. Additional excavation outside the above limits, including additional excavation required to comply with OSHA regulations or to install shoring, bracing or trench box shall not be considered in computation of rock quantities for payment.

3.2 REPLACEMENT MATERIAL

- A. The Contractor shall provide replacement material either from previously stockpiled trench excavation materials or borrow material to backfill over and around the pipe or structures as specified in Division 2, Section "Trenching for Utilities" and such cost will be included in the change order price for rock excavation.

PART 4 - BASIS OF PAYMENT

- 4.1 Measurement of rock will be on a cubic yard's basis as verified by the engineer or the city representative on site.
- 4.2 Underruns or overruns of estimated contract quantities shall not be the basis for any claims made by the contractor against the owner or Engineer and the contract unit price and payment will be full compensation for all work covered by this article regardless of the quantity of actual rock excavation encountered, including replacement material.

END OF SECTION 02322

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SECTION 02325

BORING AND JACKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplementary Conditions and Division 1-16 Specifications Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes installation of **guaranteed** bored and jacked pipeline casings, through whatever material is encountered where cased pipelines are required.
- B. Related Sections include the following:
 - 1. Division 1 Section "Measurement and Payment" for a schedule of unit prices.
 - 2. Division 2 Section "Dewatering" for lowering and disposing of ground water during construction.
 - 3. Division 2 Section "Excavation Support and Protection".
 - 4. Division 2 "Trenching for Utilities".

1.3 SUBMITTALS

- A. Product data for casing pipe, carrier pipe, and spacers/spiders.

1.4 PROJECT CONDITIONS

- A. Conduct all work within NCDOT right-of-way and permanent/temporary construction easement limits.
- B. Minimize work inside CSX Railroad right-of-way, keeping pits, spoils, and equipment outside of right-of-way limits to the fullest extent possible.
- C. Coordinate and schedule work with NCDOT personnel as required. Comply with NCDOT encroachment agreements.
- D. Provide traffic control as required by NCDOT.
- E. Protect existing underground and overhead utility pipes, poles, lines, services, structures, etc., from damage or interruption of service by the conduct of construction operations. Location and protection of all underground utilities and structures in the path of construction is the responsibility of the Contractor.

PART 2 - PRODUCTS

2.1 CASING PIPE

- A. Casing pipe shall be welded steel, smooth wall pipe conforming to ASTM A139, except that the hydrostatic test is not required. The casing shall be coated on the exterior with a coal tar epoxy. Field connections between sections of pipe shall be continuous circumferential welded joints.
- B. The diameter of the casing pipe shall be as indicated on the Drawings. The wall thickness of the casing pipe shall be as follows, unless otherwise noted on drawings:

<u>Nominal Diameter (Inches)</u>	<u>Wall Thickness (Inches)</u>
Under 12	0.188
12	0.250
16	0.250
18	0.250
24	0.250
30	0.312
36	0.375
42	0.500
48	0.500

2.2 CARRIER PIPE

- A. The product transporting pipeline that is inserted through the casing pipe is referred to hereinafter as "carrier pipe". The pipe size, material, and application (water supply, gravity sewer, and sewage force main) shall be as indicated on the drawings.
- B. For installations involving gravity sewer lines, manufactured casing spacers/spiders shall be used to maintain proper line and grade of the carrier pipe. Spacer spacing shall not exceed ten feet on center. Spacers shall be equal to Model 4810 stainless steel Casing Chocks as manufactured by Power Seal.

PART 3 - EXECUTION

3.1 PROTECTION OF EXISTING UTILITIES

- A. Locate and protect all existing overhead and underground utilities.

3.2 EXCAVATION

- A. Excavate suitable pits or trenches. Provide suitable sheeting and bracing where necessary. Keep the work dewatered at all times.

3.3 ALIGNMENT AND GRADE

- A. Install casing pipe at the location and grade shown on the Drawings. Variation in the final position of the pipe from the line and grade shown on the Drawings will be permitted only if approved by the Engineer. The Contractor shall be responsible for all costs of realignment which result from unacceptable casings.

3.4 INSTALLATION OF CASING PIPE

- A. The diameter of the bored excavation shall conform to the outside diameter and circumference of the casing pipe as closely as practicable. Any voids which develop during the installation operation, and which are determined by the Engineer to be detrimental to the work, shall be pressure grouted with an approved mix.

3.5 INSTALLATION OF CARRIER PIPE

- A. Install carrier pipe in casing utilizing adequate blocking, bracing and skids or casing spacers per the manufacturer's recommendations.
- B. Seal casing ends against entrance of foreign material by means of casing seals, grout, brick and mortar or steel plate.

3.6 BORE AND JACK WITHIN RAILROAD RIGHT-OF-WAY

- A. The contractor shall install the encasement pipe under/across railroad Right-of-Way on a 24-hour basis without stopping (except for adding lengths of pipe) until the encasement is completely installed, the carrier pipe is installed, the ends of the encasement are sealed and the bore pits are backfilled.
- B. The contractor shall comply with all North Carolina Railroad and North Carolina Department of Transportation regulation, requirements, and encroachment Agreements (Including Encasement Pipe Thickness for the Crossing). All work on NCRR R/W shall be in accordance with Forms NCR 102" Specifications for Pipeline Occupancy" and NCR 103 "Specific Requirements of North Carolina Railroad Company for work on its Right of Way.
- C. The contractor shall comply with all CSX Railroad regulation, requirements, and encroachment Agreements (Including Encasement Pipe Thickness for the Crossing). All work on CSX R/W shall be in accordance with CSX Design and Construction Standard Specifications.
- D. The front of the pipe shall be provided with mechanical arrangements or devices that will positively prevent the auger from leading the pipe so that no unsupported excavation is ahead of the pipe.

END OF SECTION 02325

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SECTION 02530
SANITARY SEWERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1-16 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes sanitary sewers and necessary appurtenances for the sanitary sewer installation.
- B. Related Sections include the following:
 - 1. Division 1 Section "Measurement & Payment" for a schedule of unit prices.
 - 2. Division 2 Section "Trenching for Utilities" for excavating, backfilling and shaping.
 - 3. Division 3 Section "Cast-in-Place Concrete" for concrete structures and reaction blocking.
 - 4. Division 3 Section "Precast Concrete Structures" for concrete manholes and structures.

1.3 SUBMITTALS

- A. Product Data: For the following:
 - 1. Sanitary Sewer Pipe

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect pipe, pipe fittings, and seals from dirt and damage.

1.5 PROJECT CONDITIONS

- A. Locate existing structures and piping to be closed, abandoned, or connected to.
- B. Connection to Existing Facilities: Do not interrupt the flow of sewer through the existing sewer mains until the following conditions are complied with:
 - 1. Contractor to prepare a written description detailing how by-pass pumping will be achieved and maintained during the connection process. Plans shall also include provisions for back-up pumping measures in the event the initial pumps were to fail.
 - 2. Connections may not begin until written approval of the Engineer has been maintained.

PART 2 - PRODUCTS

2.1 DUCTILE IRON PIPE AND FITTINGS

A. Materials:

1. Ductile iron pipes shall conform to AWWA/ANSI C-151/A21.51. **All Ductile Iron pipe shall be Thickness Class 50 / Class 56 as indicated on the bid form and plans.**
2. Flanges for ductile iron pipe shall be in accordance with AWWA C115 and bolts, gaskets and installation shall be in accordance with AWWA C115, Appendix A, requirements.
3. Joints for ductile iron pipe and fittings shall be push-on, rubber gasketed joints in accordance with the applicable requirements of AWWA C111/ANSI A21.11. Standard push-on joints shall have a deflection capability of not less than three degrees. Special deflection bells shall have a deflection capability of not less than four degrees. The pressure rating for push-on joints shall be a minimum of 350 psi.
4. The exterior of ductile iron pipe, specials, and fittings shall be coated with an asphaltic coating in accordance with AWWA C151, Section 51-9. The finished coating shall be smooth, continuous and strongly adherent to the pipe
5. Restrained joints for ductile iron pipe and fittings shall be American Flex Ring, Griffin-Snap Lok, or US Pipe – T.R. Flex.
6. The bolts and nuts for flanged fittings and mechanical joints shall meet the requirements of ASTM A307.

B. Fittings: Ductile Iron Fittings shall meet all requirements of AWWA/ANSI C110/A21.10 and will be of the mechanical joint type.

1. The interior and exterior coatings shall be the same as specific for ductile iron pipe.
2. Fittings shall have a minimum pressure rating of 350 psi.
3. Rubber gaskets joints shall conform to AWWA/ANSI C111/A21.11.

C. Interior Lining – Protecto 401 Ceramic Epoxy Lining

2.2 POLY VINYL CHLORIDE (PVC) PIPE

A. Materials:

1. PVC Gravity Sewer Pipe shall conform to ASTM F679 standards for SDR-35 (PS46) and SDR-26 (PS115).
2. PVC gasket shall conform to ASTM F477 standards.
3. PVC integral bell joint shall conform to ASTM D3212 standards.

PART 3 - EXECUTION

3.1 GENERAL

- A. Care shall be taken in loading, transporting, and unloading to prevent injury to the pipe or coatings. Pipe or fittings shall not be dropped. All pipe or fittings shall be examined before laying, and no piece shall be installed which is found to be defective. Any damage to the pipe coatings shall be repaired as directed by the Engineer.
- B. Pipe and fittings shall be subjected to a careful inspection just prior to being laid or installed. If any defective pipe is discovered after it has been laid it shall be removed and replaced with a sound pipe in a satisfactory manner at no additional expense to the Owner. All pipe and fittings shall be thoroughly cleaned before laying, shall be kept clean until they are used in the work, and when installed or laid, shall conform to the lines and grade required.
- C. Underground piping shall slope uniformly between manholes.
- D. Contractor shall exercise extreme care when constructing piping to protect from damage all existing underground utilities, and all existing structures.

3.2 INSTALLATION

- A. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements. Maintain swab or drag in line and pull past each joint as it is completed.
- B. Pipe shall be installed using bedding, as shown in the Contract Documents, and in accordance with requirements of Industry Standard Specifications except as otherwise provided herein. A firm, even bearing throughout the length of the pipe shall be constructed by tamping bedding material at the sides of the pipe up to the elevation designated by the bedding type. Bell holes shall be hand excavated to insure uniform bearing along the pipe barrel. Pipes will be laid with bell on the uphill end of the pipe.
- C. Prior to being lowered into the trench, each pipe will be inspected by the crew foreman. Faulty pipe shall be rejected and removed from the work site. Pipes having any defects which are insufficient to cause the rejection of the pipe will be laid so as to bring defects in the top half of the sewer, observing such special directions as the Engineer may give with reference thereto. All pipes shall be sound and clean before laying. When laying is not in progress, including lunchtime, the open ends of the pipe shall be closed by watertight plug or other approved means.
- D. No pipe will be stockpiled or temporarily laid out within ten (10) feet of excavation in earth or within thirty (30') feet of rock which must be blasted for removal. All pipes will be protected against injury from falling rock when blasting.
- E. The pipe and fittings will be laid in the trench so that after the sewer is completed the invert of the pipe will conform accurately to the line and grade shown on the plan or as revised by the Engineer.

- F. Whenever the Engineer's drawings show, or for other reasons it may be necessary to change from one pipe type to another, the Contractor will furnish a donut or a flexible coupling with two stainless steel clamps, recommended by pipe manufacturers, to make the joint. A brick and mortar collar will be constructed around all joints where couplings or donuts are used unless otherwise recommended by the manufacturers.
- G. When cutting pipe is required, the cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Cut ends of pipe to be used with a bell shall be beveled to conform to the manufactured spigot end. Lining shall be undamaged.
- H. Joints:
 - 1. Push-on joints shall be made in strict accordance with the manufacturer's instructions. Pipe shall be laid with bell ends looking ahead. A rubber gasket shall be inserted in the groove of the bell end of the pipe, and the joint surfaces cleaned and lubricated. The plain end of the pipe is to be aligned with the bell of the pipe to which it is to be joined and pushed home with a jack or by other means. After joining the pipe, a metal feeler shall be used to make certain that the rubber gasket is correctly located.
 - 2. Couplings shall be placed on pipe and lubricated in accordance with manufacturer's recommendation. Pipes shall be aligned and carefully pushed together. Gasket shall be in the desired position after jointing. Invert grade of pipe shall be carefully rechecked after jointing. Any discrepancies in grade shall be corrected.
- I. Trenches shall be kept dry at all times during the laying of the pipe. At the conclusion of each day's work, the open end of the pipe shall be securely closed to prevent the entrance of water, mud, rodents, vermin, etc.
 - 1. Dewater trench as necessary to maintain dry laying conditions.
- J. The Contractor shall arrange, if requested, for the pipe manufacturer to furnish information and supervise the installation of at least the first five (5) joints of pipe installation.
- K. The Contractor shall carefully regulate his equipment and construction operations such that the loading of the pipe does not exceed the loads for which the pipe is designed and manufactured. Any pipe damaged during construction operations shall be replaced at the Contractor's expense.

3.3 BEDDING FOR SEWER PIPE

- A. General: All sanitary sewer pipe shall be provided with a firm uniform bed of granular backfill material, No. 57 stone, to fully support the pipe along its entire length. The stone shall have a minimum depth of at least six (6") inches.
- B. Ductile Iron Pipe
 - 1. Provide granular backfill material, No. 57 stone, from bottom of pipe to a depth of 1/8 diameter of pipe where the depth of cover is less than 24 feet.
 - 2. Provide granular backfill material, No. 57 stone, from bottom of pipe to top of pipe where cover is greater than 24 feet but less than 40 feet.

C. PVC Pipe

1. Provide granular backfill material, No. 67 stone, from 6" below bottom pipe to top of pipe in accordance with construction documents.

3.4 FIELD QUALITY CONTROL

- A. Clear interior of piping and structures of dirt and superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed.
- B. Place plug in end of incomplete piping at end of day and when work stops.
- C. Flush piping between manholes and other structures to remove collected debris.
- D. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after backfill is in place, and again at completion of Project.
- E. Defects requiring correction include the following:
 1. Alignment: Less than full diameter of inside of pipe is visible between structures.
 2. Crushed, broken, cracked, or otherwise damaged piping.
 3. Infiltration: Water leakage into piping.
 4. Exfiltration: Water leakage from or around piping.
- F. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
- G. Reinspect and repeat procedure until results are satisfactory.

3.5 TESTING GRAVITY SEWERS

- A. The Contractor shall test all gravity sewer mains in accordance with one of the following methods described in this section. The test method to be performed by the Contractor shall be approved and verified by the Engineer.
- B. Contractor shall furnish all labor, materials, equipment and apparatus required to perform gravity sewer testing.
- C. Engineer shall be present for all testing. Contractor to schedule test time with Engineer; however, Contractor shall give Engineer at least 24-hour notice of test time. Engineer will document all testing and distribute copies of test results to Contractor and Owner.
- D. Low Pressure Air Testing
 1. All air testing shall be in accordance with ASTM C-828-86 or latest revision.
 2. Air leakage testing of installed system shall be performed with a continuous monitoring gauge no less than 4 inches \pm (4") in diameter with minimum divisions of 0.10 psi and an accuracy of \pm 0.04 psi. All air used shall pass through a single, above ground control panel visible to the Project Representative during the testing.

3. Determine the groundwater elevation and determine the average groundwater head above the section of line being tested. Adjust the following test pressures by adding 0.43 psi per foot of groundwater head.
4. Pressurize the system to 4.0 psi (greater than average groundwater pressure). Throttle the air supply to maintain that constant pressure for at least 2 minutes. The air pressure supply shall then be disconnected from the system or shut off.
 - a. Do not enter the manhole during test.
 - b. Do not exceed 9.0 psi in the system.
5. Observe the continuous monitoring gauge while decreasing the pressure to no less than 3.5 psi (greater than groundwater pressure). At a reading of 3.5 psi, or any convenient observed pressure reading between 3.5 psi and 4.0 psi, timing shall commence with a stopwatch or other timing device that is at least 99.8% accurate.
6. Measure the time interval for pressure to drop 1.0 psi.
 - a. If the time, shown in the following Table 1 for the designated line size and length, elapses before the air pressure drops 1.0 psi, the section undergoing test may be discontinued once the prescribed time has elapsed even though the 1.0 psi drop has not occurred.
 - b. If pressure drops 1.0 psi before the appropriate time shown in the Table 1 has elapsed, the air loss rate shall be considered excessive and the section of pipe has failed the test.

Table 1 Minimum Test Times For Various Pipe Sizes

<u>Pipe Diameter</u> <u>(Inches)</u>	<u>Time</u> <u>(Minutes/100 ft.)</u>
12	1.8
18	3.0
24	3.6
30	4.8
42	7.3

7. If the section fails the air test, the Contractor shall determine at his own expense the source, or sources of leakage, and shall repair or replace all defective materials and workmanship. Repeat procedure until results are satisfactory.

E. Infiltration/Exfiltration Testing

1. The Engineer will determine the type of test required for each section after the ground water table has been measured by the Contractor. The following general criteria will govern the type of test to be conducted.
 - a. Wherever the ground water table is measured to be not less than 3' above the top of the pipe throughout the full length in the section being tested, an infiltration test may be used.

- b. Wherever the ground water table is measured to be less than 3' above the top of the pipe at the highest point in the section being tested, an exfiltration test may be used.
 2. When conditions are suitable for testing the pipe by an infiltration test, test the pipe and manholes in sections not longer than 1,000 feet in length by the following procedures:
 - a. Install a watertight plug with a 2" tapped connection in the pipe just upstream of the manhole at the low end of the section being tested. The tap shall be in the plug at or above the centerline of the carrier pipe and the entire installation shall cause all water flowing through the carrier pipe to pass through the tap. Install a short section of pipe in the tap as required to catch and measure the water flowing through the carrier pipe with a calibrated container.
 - b. Install a watertight plug in the carrier pipe just upstream of the manhole at the high end of the section being tested.
 - c. Allow the flow from infiltration to stabilize and become relatively constant in the 2" pipe. Fill the calibrated container with the flow and record the fill time with a stopwatch.
 - d. Recheck the ground water table to assure the level is still more than 3' above the invert of the pipe at the highest point in the section being tested.
 - e. The pipe and manholes will have passed the test if the infiltration does not exceed a flow rate of 10 gallons per day per inch of pipe diameter per mile of length.
 - 1.) This criterion shall be computed for each section of pipe by measuring the amount of time required to add one gallon of water to a container unless otherwise directed by the Engineer.
 3. When conditions are suitable for testing the pipe by an exfiltration test, test the pipe and manholes in sections not longer than 1,000 feet in length by the following procedures:
 - a. Install a watertight plug in the carrier pipe just upstream of the manhole at the low end of the section being tested. The plug should be securely anchored or blocked since it will be subjected to hydrostatic pressures.
 - b. Install a watertight plug in the carrier pipe just upstream of the manhole at the upper end of the section being tested.
 - c. Fill the section of pipe including interim manholes with water until the water level in the manhole at the high end of the section is approximately 3' above the top of the pipe. Care should be taken during filling to assure that no air has been trapped in the pipe. For each foot that the average ground water table is above the bottom invert of the pipe, add 1' to the water level at which the line is tested. Where the measured ground water table is found to be 3' or more above the top of the carrier pipe, the Engineer may require an alternative testing procedure.

- d. After filling, allow the section to stand for a period of 4 hours or longer as required to assure that the pipe and manhole walls are saturated. Add water as required to maintain the water level in the upstream manhole at least 3' above the top of the pipe.
 - e. After the pipe and manhole walls are saturated, add water as required to bring the water level to 3.5' above the top of the pipe in the upstream manhole. Recheck the ground water table and make any necessary adjustments to the test level.
 - f. Mark the water level in the upstream manhole on the manhole wall and allow the section to sit for one (1) hour.
 - g. Then, quickly add water to the system and measure the amount of water required to bring the water level back to the mark previously placed on the manhole wall.
 - h. The section of pipe will have passed the test if the exfiltration rate does not exceed 10 gallons per day per inch of pipe diameter per mile of length.
4. If, for any reason, a section of pipe fails either of the tests procedures previously outlined or any substitute test procedure approved by the Engineer, the Contractor shall locate the defective materials and/or installation and make any necessary repairs. After the corrective actions have been taken, the section of pipe shall be retested subject to the same provisions or requirements outlined above.
- a. No sealant shall be used in the newly installed sewers to correct leaks without prior approval of the Engineer. The extent and type of repair which may be allowed shall be subject to the approval of the Engineer.

END OF SECTION 02530

SECTION 02540
SEWER FORCE MAINS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1-16 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes sanitary sewers and necessary appurtenances for the sanitary sewer installation.
- B. Related Sections include the following:
 - 1. Division 1 Section "Measurement & Payment" for a schedule of unit prices. (N/A)
 - 2. Division 2 Section "Trenching for Utilities" for excavating, backfilling and shaping.

1.3 SUBMITTALS

- A. Product Data: For the following:
 - 1. Pipe, valves, valve boxes, air release valves

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect pipe, pipe fittings, and seals from dirt and damage.

1.5 PROJECT CONDITIONS

- A. Locate existing structures and piping to be closed, abandoned, or connected to.
- B. Connection to Existing Facilities: Do not interrupt the flow of sewer through the existing sewer mains until the following conditions are complied with:
 - 1. Contractor to prepare a written description detailing how bypass pumping will be achieved and maintained during the connection process. Plans shall also include provisions for back-up pumping measures in the event the initial pumps were to fail.
 - 2. Connections may not begin until written approval of the Engineer has been maintained.

PART 2 - PRODUCTS

2.1 DUCTILE IRON PIPE AND FITTINGS

- A. Pipe Materials: Ductile iron pipes shall conform to AWWA/ANSI C-151/A21.51. **All ductile iron pipe shall be Thickness Class 50.**

1. Flanges for ductile iron pipe shall be in accordance with AWWA C115 and gaskets and installation shall be in accordance with AWWA C115, Appendix A, requirements. All hardware shall be AISI Type 304 Stainless Steel for all flanged fittings.
 2. The exterior of ductile iron pipe, specials, and fittings shall be coated with an asphaltic coating in accordance with AWWA C151, Section 51-9. The finished coating shall be smooth, continuous and strongly adherent to the pipe.
 3. Restrained joints for ductile iron pipe and fittings shall be American Flex Ring, Snap Lok, or US Pipe – T.R. Flex.
 4. The bolts and nuts for flanged fittings and mechanical joints shall meet the requirements of ASTM A307.
- B. Fittings: Ductile Iron Fittings shall meet all requirements of AWWA/ANSI C110/A21.10 and will be of the mechanical joint type.
1. The interior and exterior coatings shall be the same as specific for ductile iron pipe.
 2. Fittings shall have a minimum pressure rating of 350 psi.
 3. Rubber gaskets joints shall conform to AWWA/ANSI C111/A21.11.
- C. Interior Lining – Standard cement lining shall be used on all pressurized pipe and fittings.
- 2.2 HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS
- A. Pipe Materials:
1. Pipe shall be manufactured in accordance with AWWA C906 with PE4710 materials.
 2. All piping shall be SDR-11 and conform to IPS dimensions, unless otherwise noted.
- B. Fittings:
1. Fittings shall be manufactured in accordance with AWWA & ASTM D2513/D3261.
 2. Fittings shall have a minimum pressure rating of 200 psi.
 3. All fittings shall be butt fusion type, unless otherwise noted.
- 2.3 MISCELLANEOUS
- A. Swing Check Valve:
1. Materials:
 - a. Body/Cover: Cast Iron, ASTM A126 Class B
 - b. Body/Cover: Cast Iron, ASTM A126 Class B
 - c. Disc: Cast Iron, ASTM A126 Class B
 - d. Body Seat Ring: Bronze, ANSI B62
 - e. Disc Seat Ring: Bronze, ANSI B62
 - f. Arm: Ductile Iron, ASTM A536 Grade 65-45-12
 - g. Hardware: Stainless Steel, AISI Type 304
 2. All ferrous materials shall be epoxy coated ID/OD.
 3. All swing check valves shall be of the lever and weight design.
 4. Basis of Design – Mueller A-2600 Swing Type Lever & Weight Check Valve

B. Gate Valve:

1. Materials:
 - a. Body: Ductile Iron, ASTM A536 Grade 65-45-12
 - b. Bonnet: Ductile Iron, ASTM A536 Grade 65-45-12
 - c. Stuffing Box: Ductile Iron, ASTM A536 Grade 65-45-12
 - d. Disc/Wedge: Ductile Iron, ASTM A536 Grade 65-45-12
 - e. Disc Encapsulation: Styrene Butadiene Rubber (SBR), ASTM D2000
 - f. Stem: Manganese Bronze, CDA Alloy C67600
 - g. Hardware: Stainless Steel, AISI Type 316
2. All ferrous materials shall be epoxy coated ID/OD.
3. Exposed gate valves shall be OS&Y type with handwheel operator and Class 125 flanges.
4. Buried gate valves shall be non-rising stem type with a 2" square operating nut and mechanical joint ends.
5. Basis of Design – Mueller A-2361 Resilient Wedge Gate Valve

C. Air/Vacuum Valve:

1. Materials:
 - a. Body: Stainless Steel, Type 316
 - b. Float: Stainless Steel, Type 316
 - c. Internal Linkage: Stainless Steel, Type 316
 - d. Replaceable Seat: Buna-N Rubber
 - e. Hardware: Stainless Steel, Type 316
2. The valve shall be designed to exhaust air during the filling of a pipeline and to admit air into the system during pipeline draining
3. Basis of Design – Crispin Valve UX20 Combination Air Release Valve

D. Restrained Dismantling Joint:

1. Materials:
 - a. Follower: Ductile Iron, ASTM A536 Grade 65-45-12
 - b. Sleeve/Spool Weldment: Carbon Steel, ASTM A283C
 - c. Flanges: Carbon Steel, ASTM A36
 - d. Hardware: Stainless Steel, AISI Type 304
 - e. Gasket: Nitrile/Buna-N
2. All ferrous materials shall be epoxy coated ID/OD.
3. Dismantling joint must be of the restrained design. Unrestrained dismantling joints will not be acceptable.
4. Basis of Design – Smith-Blair Model 975 Dismantling Joint (Restrained)

PART 3 - EXECUTION

3.1 GENERAL

- A. Care shall be taken in loading, transporting, and unloading to prevent injury to the pipe or coatings. Pipe or fittings shall not be dropped. All pipe or fittings shall be examined before laying, and no piece shall be installed which is found to be defective. Any damage to the pipe coatings shall be repaired as directed by the Engineer.

- B. Pipe and fittings shall be subjected to a careful inspection just prior to being laid or installed. If any defective pipe is discovered after it has been laid it shall be removed and replaced with a sound pipe in a satisfactory manner at no additional expense to the Owner. All pipe and fittings shall be thoroughly cleaned before laying, shall be kept clean until they are used in the work, and when installed or laid, shall conform to the lines and grade required.
- C. Underground piping shall slope uniformly between manholes.
- D. Contractor shall exercise extreme care when constructing piping to protect from damage all existing underground utilities, and all existing structures.

3.2 INSTALLATION

- A. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements. Maintain swab or drag in line, and pull past each joint as it is completed.
- B. When cutting pipe is required, the cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Cut ends of pipe to be used with a bell shall be beveled to conform to the manufactured spigot end. Lining shall be undamaged.
- C. The Contractor shall arrange, if requested, for the pipe manufacturer to furnish information and supervise the installation of at least the first five (5) joints of pipe installation.
- D. The Contractor shall carefully regulate his equipment and construction operations such that the loading of the pipe does not exceed the loads for which the pipe is designed and manufactured. Any pipe damaged during construction operations shall be replaced at the Contractor's expense.

3.3 FIELD QUALITY CONTROL

- A. Clear interior of piping and structures of dirt and superfluous material as work progresses.
- B. Inspect interior of piping to determine whether line displacement or other damage has occurred.

3.4 TESTING FORCE MAINS

- A. The Contractor shall pressure test all force mains in accordance with water main standards.
- B. Contractor shall furnish all labor, materials, equipment and apparatus required to perform force main testing.
- C. Engineer shall be present for all testing. Contractor to schedule test time with Engineer; however, Contractor shall give Engineer at least 24-hour notice of test time. Engineer will document all testing and distribute copies of test results to Contractor and Owner.
- D. The Contractor shall plug and brace the end of the force main in the discharge manhole for testing. The Contractor will test and check valves in the valve vault. The Contractor will provide a test port for testing or pressuring the force main and plug the port when testing is completed. The Contractor will test each valve once the force main pressure test is complete.

- E. All ductile iron fittings and other force main components subject to hydrostatic thrust shall be securely anchored by use of concrete thrust blocks poured in place, unless otherwise directed by the Engineer. The reaction areas required for these thrust blocks shall be determined by the job conditions and shall conform to Section 12 AWWA C-600.
- F. Material for reaction blocking shall be a minimum of 3000 PSI.
- G. Blowoffs. The Contractor shall provide a temporary blowoff.
- H. Testing of Force Main. All force mains before final acceptance shall be tested by filling the line with water, care being taken to expel all air. A pressure of 150 psi shall be applied to the line at the test pump and shall be maintained at that pressure for a minimum period of 2 consecutive hours. All defective material found shall be replaced by the Contractor. All leaking joints shall be made tight. The pipe installation will not be accepted unless and until the leakage, evaluated on the pressure test of 150 psi for a minimum of 2 hours, does not exceed 1.0 gallons per day per mile of pipe per inch of nominal diameter. Clean water and test pump shall be provided by the Contractor and approved by the Engineer.

Do not allow trash, debris, stones, mud, etc. in the force main.

In general, the pressure test and the leakage test shall be performed in the manner set forth in Section 13 of AWWA Standard C-600, except that the Contractor shall furnish his own pressure gauges. The pressure test and the leakage test shall be performed by the Contractor.

- I. Chlorination of Force Main. A chlorination test will not be required on the force main.

END OF SECTION 02540

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SECTION 02825

LAWNS AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1-16 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Ground Preparation.
 - 2. Furnishing and applying lime and fertilizer.
 - 3. Seeding and mulching.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 2 Section "Trenching for Utilities".

1.3 SUBMITTALS

- A. Certification of grass seed from seed vendor for each grass-seed mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver seed, limestone, and fertilizer in original sealed, labeled, and undamaged containers. Store in dry containers and in accordance with manufacturer's recommendations.

1.5 COORDINATION AND SCHEDULING

- A. The Contractor shall seed and mulch all disturbed areas within 2 weeks after the trench has been installed and the trench backfilled. Where ingress and egress routes require utilization of an area where the trench has been backfilled a ten (10') foot wide strip on the high side of the easement may remain unseeded. Once the ingress and egress location is no longer required for access, unseeded strip shall be seeded and mulched within 15 calendar days.

PART 2 - PRODUCTS

2.1 SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with the Association of Official Seed Analysts' "Rules for Testing Seeds" for purity and germination tolerances.

2.2 LIME

- A. Lime: Commercial grade agricultural limestone in the form of dolomitic limestone.

2.3 FERTILIZER

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea-form, phosphorous, and potassium in the following composition:

- 1. Composition: 10 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.

2.4 MULCHES

- A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat.
- B. Fiber Mulch: Biodegradable dyed-wood cellulose-fiber mulch, nontoxic, free of plant growth- or germination-inhibitors, with maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.
- C. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application, nontoxic and free of plant growth - or germination-inhibitors. Minimum tack rate is 10#/1,000 sq. ft.

2.5 EROSION CONTROL MATERIALS

- A. Blankets: Biodegradable wood or straw, or fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.
 - 1. North American Green S150 or equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive seeding for compliance with requirements and for conditions affecting performance of work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 GROUND PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
- B. Limit subgrade preparation to areas that will be planted in the immediate future.

- C. Loosen subgrade to a minimum depth of 4 inches by plowing, disking and harrowing until these areas are friable and well pulverized. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter detrimental to final grading, proper bonding or the proper growth of the planting. If the prepared surface becomes eroded as a result of rain or for any other reason, or becomes crusted before the seed is sown, the surface shall again be placed in a condition suitable for seeding.

3.3 LIME APPLICATION

- A. After the area to be seeded has been brought to finished grade, lime shall be uniformly distributed at a rate of 4,000 pounds per acre over the seeding area with a mechanical spreader.

3.4 FERTILIZER APPLICATION

- A. Commercial fertilizer grade 10-10-10 shall then be distributed uniformly at the rate of 1,000 pounds per acre and shall be uniformly mixed with the soil to a depth of at least 4 inches by disking, harrowing or by other methods acceptable to the Engineer.
- B. Fertilizer shall not be applied when the wind makes it difficult to get satisfactory distribution.

3.5 SEEDING

- A. The seed shall be a mixture as shown on the construction drawings. The seed shall be uniformly sown by approved mechanical power drain drills, or in small areas, by mechanical hand seeders. The seeds shall be covered and compacted to a depth of 1/8 to 1/2 inch by means of a cultipacker and an empty traffic roller or another roller weighing less than 3 tons. Broadcast seeding shall not be done when the wind makes it difficult to get satisfactory distribution.

3.6 HYDROSEEDING

- A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogenous slurry suitable for hydraulic application.
 1. Mix slurry with nonasphaltic tackifier.
 2. Apply slurry uniformly to all areas to be seeded in a 1-step process. Apply mulch at the minimum rate of 1500 lb per acre (16.5 kg per 100 sq. m) dry weight but not less than the rate required to obtain specified seed-sowing rate.
 3. Apply slurry uniformly to all areas to be seeded in a 2-step process. Apply first slurry application at the minimum rate of 500 lb per acre (5.5 kg per 100 sq. m) dry weight but not less than the rate required to obtain specified seed-sowing rate. Apply slurry cover coat of fiber mulch at a rate of 1000 lb per acre (11 kg per 100 sq. m).

3.7 MOISTURE

- A. Seed shall not be sown unless the soil has the optimum moisture content or more through a depth of at least 4 inches, nor shall it be sown when there is frost in the ground. The Owner has the authority to postpone seeding at any time when weather and moisture conditions are not favorable.

3.8 MULCH

- A. All areas to be seeded shall be uniformly mulched in a continuous blanket immediately after seeding using Wheat straw at a minimum of 2 1/2 tons per acre. The rate of application will correspond to a depth of at least one inch and not more than one and one half inches, according to the texture and moisture content of the mulch material. It is intended that mulch shall allow some sunlight to penetrate and air to circulate, at the same time shading the ground, reducing erosion and conserving soil moisture. The Contractor shall take steps necessary to prevent loss of mulch or bunching of mulch as caused by the wind. All mulch shall be tacked per DOT standards.

3.9 MAINTENANCE

- A. The Contractor shall maintain all seeded and mulched areas in a satisfactory condition until final acceptance of the work. This includes repairing washes that occur, and the application of additional seed, installation of additional lime, and/or fertilizing and watering as needed.

3.10 STAND OF GRASS

- A. If, after a suitable growth period, a satisfactory stand of grass is not evident, the unsatisfactory areas shall be reseeded, including any additional ground preparation, liming, and fertilizing necessary, using the type of seed specified. A stand of grass is defined as a full cover, over the areas seeded and mulched, with grass that is alive and growing.

END OF SECTION 02825

SECTION 02832

CHAIN LINK FENCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1-16 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This section covers chain link fencing and gates used in the following locations:
 - 1. Perimeter of the lift station.

PART 2 - PRODUCTS

2.1 FENCE TYPE

- A. Fencing shall conform to the details indicated on the drawings and shall be of the following general types.
 - 1. Perimeter Fencing – Perimeter fencing shall consist of galvanized or aluminum coated steel fabric, with a top rail, bottom tension wire, and three strands of barbed wire mounted on 45 degree extension arms. The fabric height shall be 6 feet for perimeter fencing. The upper strand of barbed wire shall be approximately 12 inches out from the fence and 12 inches above the top of the fabric. Posts shall be set in concrete.

2.2 FENCE MATERIALS

- A. Steel Fencing – All steel or malleable iron parts and accessories shall be hot-dip galvanized or aluminum coated after fabrication.
 - 1. Fabric – 9 gauge, 2 inch mesh; galvanized ASTM A392, Class 2, or aluminum coated, ASTM A491; knuckled selvage on top, twist selvage on bottom.
 - 2. Posts – Steel pipe, ASTM F669, Group IC, with ASTM F1234, Type B interior and exterior protective coating.
 - 3. Line Posts (for 6 Foot Fencing) – 2-3/8 inch OD pipe, 3.12 lb. per ft. min.
 - 4. Terminal Posts (for 6 Foot Fencing) – 2-7/8 inch OD pipe, 4.64 lb. per ft. min
 - 5. Gate Posts:
 - a. Gate or leaf 6 ft. or less, 2-7/8 inch OD pipe, 4.64 lb. per ft.
 - b. Gate or leaf over 6 ft., 4 inch OD pipe, 6.56 lb. per ft.;
 - c. Gate or leaf over 13 ft. 6-5/8 inch OD pipe, 18.97 lb. per ft.;
 - d. Gate or leaf over 18 ft., 8-5/8 inch OD pipe, 28.55 lb. per ft.

6. Top Rails – 1-5/8 inch OD steel pipe, 1.40 lb. per ft.
7. Rail Couplings – Sleeve type, 6 inches long, ASTM F626.
8. Bracing – Pipe brace same as top rail, with 3/8 inch diameter steel rod truss and tightener.
9. Post Tops – Pressed steel, malleable iron with pressed steel extension arm, or one-piece aluminum casting, ASTM F626.
10. Barbed Wire – Galvanized, ASTM A121, Class 2, or aluminum coated, ASTM A585, Type I; three 12-1/2 gauge steel wires with four-point barbs.
11. Stretcher Bars – Steel, ASTM F626, 3/16 inch by 3/4 inch, or equivalent area.
12. Fabric Ties – Aluminum bands or wires, ASTM F626.
13. Gate Frames – Steel tubing, 1-7/8 inch OD, 2.28 lb. per ft.
14. Tension Wire – ASTM A824, galvanized or aluminum coated oil spring wire, 7 gauge.
15. Handrail-Setting Cement – Minwax “Super Por-Rok Cement” or Master Builders “Set 45”.

B. Gates

1. Gates shall be swing type (except where noted as a sliding gate – all components shall be heavy duty industrial components), hanged to swing 180 degrees from closed to open, complete with frames, latches, stops, keepers, hinges, braces and three strands of barbed wire. Gates greater than 8 feet in length shall be double swing type. Barbed wire will be required for perimeter gates only. Gate leaves shall have intermediate members and diagonal truss rods as required for rigid construction and shall be free from sag or twist. When adjacent fence has barbed wire, gates shall be fitted with vertical extension arms or shall have frame end members extended to carry barbed wire. Joints between frame members shall be made by welding or by means of heavy fittings, and shall be rigid and watertight. Gate fabric shall be same as fence fabric and shall be attached to frame ends by stretcher bars, bolt hooks, or other mechanical means.
2. Hinges shall be heavy pattern with large bearing surfaces and shall not twist or turn under the action of the gate. Latches shall be plunger bar type, full gate height, and arranged to engage the gate stop, except single gates less than 10 feet wide shall be provided with a forked latch. Latches shall be arranged for padlocking with the padlock accessible from both sides of the gate. Stop shall consist of a roadway plate with anchor set in concrete and arranged to engage plunger. Keepers shall consist of mechanical devices for securing and supporting the free end of the gate when in the full open position.
3. Gates shall be installed so that they cannot be removed without disassembly of the hardware. Hardware attachment bolts shall be pinned so that removal will be difficult.

PART 3 - EXECUTION

3.1 FENCE CONSTRUCTION

- A. The installed fence shall conform to the alignment and finish grade indicated. All posts shall be plumb. Unless otherwise indicated on the drawings, posts shall be spaced approximately 10 feet apart for perimeter fencing. Where necessary, the fence grade shall be adjusted to fit the ground contour by slipping the fence fabric links. Ground surface irregularities shall be graded as required to maintain not more than 2 inches clearance below the bottom of the fence fabric.
- B. Where the fencing is supported by a concrete structure, posts shall be set in sleeves that provide at least $\frac{1}{4}$ inch clearance all around. Sleeves shall be fabricated from Schedule 40 black steel pipe and hot-dip galvanized after fabrication. Sleeves shall be 5 inches long unless otherwise indicated on the drawings. Sleeves shall be rigidly supported in accurate alignment in the forms and shall be positioned vertically so that the top of the sleeve is approximately $\frac{1}{2}$ inch below the finish concrete surface. Posts shall be wedged in accurate alignment, and the annular space between posts and sleeves shall be filled with handrail-setting cement to the top of the steel sleeve. Filling of the remaining space with sealant, as indicated on the drawings, is covered in the caulking section.
- C. Where posts are set in earth, concrete foundations 36 inches deep shall be provided. If bedrock is encountered, post excavation shall be continued to the 36 inch depth or 18 inches into the bedrock, whichever is less. Concrete foundations shall be circular in horizontal sections, not less than 10 inches in diameter for line posts, and with a diameter not less than the post OD plus 9 inches for a terminal and gate posts, except that foundations in bedrock shall be a minimum of 6 inches larger than the outside dimension of the post. Foundations shall extend above the ground surface and shall be crowned approximately one inch. Concrete for foundations shall conform to the cast-in-place concrete section. Each foundation shall be cured for at least 72 hours before further work is done on the post.
- D. Top rails, bottom rails, and bottom tension wires shall be installed before the fabric. Top and bottom rails shall be furnished in at least 18 foot lengths and shall be securely connected to gate and terminal posts. Tension wires shall be installed approximately 6 inches above grade and shall be attached to each post and securely anchored at terminal and gate posts. Straight runs between braced posts shall not exceed 1,500 feet. A terminal post shall be provided at each change in slope.
- E. Fabric shall be attached to the top rail, bottom rail, and bottom tension wire at 24 inches centers, and to the line posts at 15 inch centers. Barbed wire shall be fastened to each extension arm by internal clips or external fabric ties. Stretcher bars shall be provided at each gate and terminal post. Each stretcher bar shall be threaded through the fabric and anchored to the post at 15 inch centers by positive mechanical means.
- F. Each gate and terminal post shall be braced by a horizontal pipe brace and an adjustable truss extending to an adjacent line post. Corner posts shall be braced in both directions.
- G. Fabrics shall be stretched taut and anchored so that a pull of 150 pounds at the middle of a panel will not lift the bottom of the fabric more than 6 inches.
- H. All surfaces of aluminum which will be in contact with concrete, mortar, or dissimilar metals shall be given a heavy coat of coal tar paint.

3.2 SUBMITTAL DATA

- A. Complete detail drawings and specifications for the fence, gates, and accessories shall be submitted in accordance with the submittals sections.
- B. See construction plans – site and utility plan for fence dimensions. In the event of any discrepancies, use the most heavy duty or larger size material.
- C. All materials and parts shall be used for heavy duty industrial applications.

END OF SECTION 02832

SECTION 03100
CONCRETE FORMWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1-16 Specifications Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Formwork for cast-in place concrete, with shoring, bracing and anchorage.
- B. Openings for other work.
- C. Form accessories.
- D. Form stripping.

1.3 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION

- A. Embedded items including, but not limited to, inserts, sleeves, wall castings, wall thimbles, gate guides, anchors, and anchor bolts, as shown or specified to be embedded.

1.4 DESIGN REQUIREMENTS

- A. Design, engineer and construct formwork, shoring and bracing to comply with code requirements; resultant concrete to conform to required shape, line and dimension.

1.5 QUALITY ASSURANCE

- A. Comply with ACI 301, ACI 318, and ACI 347.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faces, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimum number of form marks.
 - 1. Plywood: U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood", Class 1, Exterior Grade or better, mill-oiled and edge sealed, with each piece bearing legible inspection trademark.
- B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.

2.2 FORMWORK ACCESSORIES

- A. Form Ties: Factory fabricated removable or snap-off metal type, designed to prevent form deflection and to prevent spalling concrete upon removal. Units to leave no metal closer than 1-1/2 inches to surface.
- B. Form Release Agent: Colorless mineral oil which will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete including curing compound, sealer, or waterproofing.
- C. Comers: Chamfered strip type, 3/4 x 3/4 inch size; maximum possible lengths.
- D. Dovetail Anchor Slot: Galvanized steel, 22 gage thick, foam filled slots, nail holes for securing to concrete formwork.
- E. Waterstop: Polyvinyl chloride, minimum 1,750 psi tensile strength, minimum -40 degrees F working temperature, 6 inch wide, 3/16 inch thick, maximum possible lengths, ribbed profile, preformed corner sections, heat welded jointing.
- F. Special Waterstop: Polyvinyl chloride, minimum 1,750 psi tensile strength, minimum -40 degrees F working temperature, 9 inch wide, 3/8 inch thick, 1/2 inch I.D. minimum center bulb, maximum possible lengths, ribbed profile, heat welded jointing.
- G. Preformed Plastic Adhesive Waterstop (PPAWS): Federal Specification SS-SS-210A; single component self-sealing plastic adhesive type, extruded rope form between two protective silicone treated papers, 1 inch square cross section, 1 inch lap slice, furnish with primer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with Drawings.

3.2 EARTH FORMS

- A. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete. Earth forms subject to Engineer's approval.

3.3 ERECTION - FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements; comply with ACI 301. Use selected materials to obtain required finishes.
- B. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances; comply with ACI 347.
- C. Align joints and make watertight.
- D. Obtain approval before framing openings in structural members which are not indicated on Drawings.

- E. Provide chamfer strips on all external corners, and on other edges as indicated.
- F. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before concrete is placed. Retighten forms and bracing after concrete placement, if required.
- G. Set edge forms or bulkheads and intermediate screed pins or strips for slabs to obtain required elevations and contours in finished slab surface.

3.4 APPLICATION – FORM RELEASE AGENT

- A. Clean reused forms of concrete residue. Repair and patch as required returning forms to acceptable surface condition.
- B. Apply form release agent on formwork prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes which are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.5 JOINTS, INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to pass through concrete work.
- B. Locate and set in place items which will be cast directly into concrete.
- C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.
- D. Install accessories straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Install waterstops continuous without displacing reinforcement. Install waterstop a minimum of 2 inches clear of reinforcing steel.
- F. Provide waterstop at all joints where shown; at all joints in tank, flume and building bottom slabs; at all joints in walls and in slabs with water or earth on one side and a dry work area or an exposed surface on the other; at all vertical joints in walls (except those with earth on both sides).
- G. Locate and install construction joints to not impair strength and appearance of the structure as indicated or as approved by Engineer.
- H. Provide keyways at least 1-1/2 inches deep in construction joints in walls, slabs, and between walls and footings.
- I. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints, except as otherwise indicated.

3.6 FORMWORK TOLERANCES

- A. Comply with ACI 301, Table 4.3.1, and ACI 347.

3.7 FORM REMOVAL

- A. Fabricate form for easy removal without hammering or prying against concrete surfaces.
- B. Forms not supporting weight of concrete such as sides of beams, walls, and columns, and similar parts may be removed after curing for 24 hours at not less than 50 degrees F. Concrete shall be sufficiently hard to not be damaged by form removal operations.
- C. Do not remove forms or bracing which support slabs and beams until field cured cylinder strength has reached 3,000 psi.

END OF SECTION 03100

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1-16 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Reinforcing steel bars, wire fabric and accessories for cast-in-place concrete and precast concrete.

1.3 SHOP DRAWINGS

- A. Submit original shop drawings prepared for fabrication, bending, and placement of concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Include special reinforcement required for openings through concrete structures.

1.4 QUALITY ASSURANCE

- A. Comply with ACI 301.
- B. Provide Engineer with access to precast plant to facilitate inspection of reinforcement. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection.
- C. Design reinforcement for precast under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of North Carolina.

PART 2 - PRODUCTS

2.1 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615, 60 ksi yield grade, deformed billet steel bars, unfinished; or ASTM A616, 60 ksi yield grade, deformed rail steel bars, unfinished.
- B. Dowel Bar Replacement (D.B.R.): Threaded bars and couplers to develop at least 125 percent of the yield strength of the bar; unified coarse threads, no tapered threads; flanged coupler with nail holes for form attachment; Dayton Superior, Williams Form Engineering, or as approved.
- C. Welded Wire Fabric: ASTM A185, plain wire.

2.2 ACCESSORIES

- A. Chairs, Bolsters, Bar Supports, and Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions.

2.3 FABRICATION

- A. Comply with CRSI Manual of Practice and ACI SP-66. No welding of reinforced bars unless authorized in writing by Engineer.

PART 3 - EXECUTION

3.1 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position. Comply with CRSI's recommended practice for placing reinforcing bars.
- B. Do not displace or damage vapor barrier.
- C. Accommodate placement of formed openings. Provide additional reinforcement as required.
- D. Unless noted otherwise, maintain concrete cover for reinforcement as follows:

<u>Item</u>	<u>Coverage</u>
Beams	1-1/2 inch
Supported Slabs and Joists	1-1/2 inch
Column Ties	1-1/2 inch
Walls (exposed to weather or backfill)	2 inch
Footings and Concrete Formed against Earth	3 inch
Slabs on Fill	3 inch
Footings or Slabs on Mud Mat	2 inch

- E. On mud mat, use steel bar chairs or other approved supports.
- F. Do not field cut reinforcement without Engineer's permission.
- G. Do not bend reinforcement after embedment in hardened concrete.
- H. Clean reinforcement of loose rust, mill scale, ice, earth, and other material which affect bond with concrete.

END OF SECTION 03200

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplementary Conditions (if included), and Division 1-16 Specifications Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Cast-in-place concrete.
- B. Control, expansion and contraction joint devices associated with concrete work, including joint sealants.
- C. Grouts.

1.3 COORDINATION OF CONCRETE SUPPORTS FOR EQUIPMENT AND PIPING

- A. The Contractor shall be responsible for providing concrete pipe supports, equipment pads, housekeeping pads, and concrete pads for all new equipment, as specified in other sections.

1.4 QUALITY ASSURANCE

- A. Comply with ACI 301 unless specifically noted otherwise.
- B. Maintain one copy of ACI 301 on site.
- C. Acquire cement and aggregate from same source for all work.
- D. Comply with ACI 305R when concreting during hot weather.
- E. Comply with ACI 306R when concreting during cold weather.

1.5 DEFINITIONS

- A. Exposed: Exposed to view by persons responsible for operation or maintenance of the structure, including, but not limited to, all tank and flume interior wall surfaces.

1.6 SUBMITTALS

- A. Laboratory Test Results: Submit laboratory test reports for concrete materials and mix design test.
- B. Materials Certificates: Provide materials certificates signed by manufacturer and Contractor, certifying that each material item complies with, or exceed, specified requirements in lieu of materials laboratory test reports when permitted by Engineer.
- C. Submit in quantities specified for Shop Drawings; follow Section 01300.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

- A. Cement: ASTM C150, Type 1 – Normal Portland type. Use one brand of cement throughout project, unless approved by Engineer.
- B. Fine and Coarse Aggregates: ASTM C33 (normal weight aggregate); materials containing deleterious substances (spalling causing) are not acceptable.
- C. Water: Clean and not detrimental to concrete.

2.2 ADMIXTURES

- A. Air Entrainment: ASTM C260; Master Builders Micro-Air, or as approved.
- B. Chemical: ASTM C494; containing no chlorides
 - 1. Type A – Water Reducing
 - 2. Type B – Retarding
 - 3. Type C – Accelerating
 - 4. Type D – Water Reducing and Retarding
 - 5. Type E – Water Reducing and Accelerating
 - 6. Type F – Water Reducing, High Range
 - 7. Type G – Water Reducing, High Range and Retarding
- C. Fly Ash: ASTM C618 Class F; loss on ignition less than 6 percent.

2.3 ACCESSORIES

- A. Bonding Agent: Latex emulsion.
- B. Special Bonding Agent: Water-based epoxy resin/Portland cement.
- C. Vapor Retarder: 6 mil thick clear polyethylene film.
- D. Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 5000 psi in 28 days.
- E. Epoxy Grout: 2-component epoxy resin bonding system capable of developing a minimum bond strength of 1100 psi in 48 hours; ASTM C881, Type N, Grade 3, Class B and C.

2.4 JOINT DEVICES AND FILLER MATERIALS

- A. Joint Filler Type A: ASTM D994; Asphalt impregnated fiberboard or felt.
- B. Joint Filler Type B: ASTM D1752; Premolded sponge rubber fully compressible with recovery rate of minimum 95 percent.
- C. Sealant: Follow Section 07900.

2.5 CONCRETE MIX

- A. Concrete Proportions: Comply with ACI 301, 3.9.
- B. Class I Concrete: Provide concrete to the following criteria:
 - 1. Compressive Strength (7 day): 3200 psi.
 - 2. Compressive Strength (28 day): 4000 psi.
 - 3. Water/Cement Ratio (maximum): 0.50 by weight.
 - 4. Air Entrained: 6 percent, ± 1 percent.
 - 5. Fly Ash Content: Maximum 25 percent of cement content.
 - 6. Slump (maximum): 3 inches (due to water).
 - 7. High Range Water Reducer: Add at site to increase slump to 6 inches, $\pm 1-1/2$ inches.
 - 8. Grout for leveling or to start wall lifts shall be of similar proportions to the mortar in the Class I concrete as approved by Engineer.
- C. Class II Concrete: Provide concrete to the following criteria:
 - 1. Compressive Strength (28 day): 2500 psi.
 - 2. Fly Ash Content: Maximum 25 percent of cement content
 - 3. Slump (maximum): 6 inches
- D. Mudmat Concrete: Provide concrete to the following criteria:
 - 1. Compressive Strength (28 day): 1000 psi.
 - 2. Fly Ash Content: Maximum 25 percent of cement content
- E. Grout: Provide concrete to the following criteria:
 - 1. Compressive Strength (28 day): 4000 psi.
 - 2. Proportions similar to Class I concrete.
 - 3. 100 percent of coarse aggregate must pass 1/2 inch sieve.

2.6 CEMENT-BASE AGGREGATE TYPE COATING

- A. Federal Spec. TT-P0035 (ARMY-CE); use with bonding agent.

PART 3 - EXECUTION

3.1 GENERAL

- A. Use Class I concrete for structural concrete and concrete for pavements, sidewalks and equipment bases; use Class II concrete for fillets and fills, and where indicated.
- B. Install vapor retarder under interior building slabs on grade. Lap joints minimum 6 inches and seal watertight by taping edges and ends.
- C. Cut contraction joints within 18 hours after placing. Cut 1/4 depth of slab thickness. If joint pattern not shown, provide joints not exceeding 15 feet in either direction and located to provide uniform slabs.
- D. Slope positively floors containing sumps, gutters, or floor drains.
- E. Provide 3 inch thick mudmats under all foundations and base slabs unless noted otherwise.

- F. Construct isolation joints in slabs on grade at points of contact between slabs on grade and vertical surfaces such as column pedestals, foundation walls, or as indicated. Use joint filler B and a sealant.
- G. Verify construction joints, waterstop, and reinforcement are acceptable.

3.2 PLACING CONCRETE

- A. Comply with ACI 301 and the following:
 - 1. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.
 - 2. Deposit concrete in forms in horizontal layers not deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
 - 3. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Comply with ACI 309 for equipment and procedures for consolidation of concrete.
 - 4. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.
- B. When Class I concrete arrives at the Project with slump below 3 inches, water may be added only if neither the maximum permissible water-cement ratio nor the maximum slump is exceeded. Slump adjustment, with water, shall be made only one time.
- C. Start wall lifts with 2 to 3 inches of grout.
- D. Placement of concrete under water is not permitted.
- E. Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
 - 1. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Bring slab surfaces to correct level with straight edge and strikeoff. Use bullfloats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
 - 3. Maintain reinforcing in proper position during concrete placement operations.

- F. Cold Weather Placing: Comply with ACI 305 and the following to protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures:
1. When air temperature has fallen to or is expected to fall below 40 degrees F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F and not more than 80 degrees F at point of placement.
 - a. Maintain concrete within this temperature range for not less than 7 days.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials or against cold reinforcing steel.
 3. Do not use calcium chloride, salt and other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix designs.
- G. Hot Weather Placing: Comply with ACI 305 and the following when hot weather conditions exist that would seriously impair quality and strength of concrete:
1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 degrees F. Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option.
 2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
 3. Fog spray forms, reinforcing steel, and subgrade just before concrete is placed.
 4. Use water-reducing retarding admixture (Type D) when required by high temperatures, low humidity, or other adverse placing conditions.

3.3 REPAIR OF DEFECTIVE AREAS

- A. Use manufactured non-shrink cementitious materials specifically formulated for patching concrete in conjunction with a compatible bonding material. The complete repair procedure along with a list of all materials to be used must be submitted to and approved by Engineer before any repair work is started.
- B. Preparation of defective areas to be approved by Engineer prior to patching.
- C. Tie Holes: Thoroughly and liberally coat with a bonding agent and then thoroughly fill with a non-shrink cementitious material using a plunger type or other mechanical injecting device to force mortar through holes passing through walls.
- D. Repair surface defects, including tie holes, immediately after form removal.
- E. Remove honeycombed and other defective concrete down to sound concrete.

3.4 CONCRETE FINISHING

- A. Concrete Floor Surfaces: Follow Section 03346.
- B. Formed Concrete Surfaces: Smooth form finish as described in ACI 301, 10.2.2, and no form marks greater than 1/16 inch in relief, unless otherwise specified.
- C. Formed Concrete Surfaces Not Exposed and Not to be Waterproofed as Specified in Section 07110: Rough form finish, at Contractor's option.
- D. Exposed Formed Surfaces of Slabs: Smooth form finish with all offsets and unevenness due to form arrangement ground smooth.
- E. Prepare concrete surfaces to be waterproofed as specified in Section 07100 in strict accordance with the waterproofing manufacturer's instructions. On surfaces to be waterproofed, defects shall include, but not be limited to, voids, air holes and honeycomb that the normal application of waterproofing will not fill or otherwise seal effectively.
- F. Exposed Interior Concrete Surfaces: Applied finish of cement-base aggregate type coating; applied to concrete with a smooth form finish; first coat to be by heavy brush at two pounds per square yard, second coat at same rate and sponge floated.
- G. Exposed Exterior Concrete Surfaces, Including Tank Interiors from Top to Two Feet Below Normal Water Surface: Cork floated finish as described in ACI 301, 10.3.3, or an applied finish of cement-base aggregate type coating.
- H. Related Unformed Surfaces, Including Tops of Walls: Strike smooth after concrete is placed and float to a texture consistent with that of the formed surfaces.

3.5 CURING AND PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Concrete Surfaces: Follow Section 03370.

3.6 FIELD QUALITY CONTROL

- A. Tests of cement and aggregates may be performed to ensure conformance with specified requirements.
- B. Tests of concrete slump, air content and strength will be made at the direction of Engineer.
- C. Tests of soil compaction will be made at the direction of Engineer.
- D. Advise the designated testing agency sufficiently in advance of, but not less than 24 hours before, operations to allow for completion of quality tests and for the assignment of personnel.
- E. Contractor responsible for additional testing expenses incurred for the purpose of making, transporting, or testing field cured cylinders.

- F. In addition to the requirements of Chapter 18 of ACI 301, those parts of a structure which will contain water during service shall be substantially watertight. Before the units are placed in service, repair all cracks and defects which impair watertightness and eliminate any leakage into or out of the structure. After proper cleaning and disinfecting, if required, fill the water containment structures with water to their maximum level, and allow the water to remain for 24 hours with associated valves and appurtenances tightly closed. During this time, the water level, as measured by a hook gage or other approved measuring device, shall not drop vertically more than a distance of 1/2 inch. If this test fails, pump out the structure and make such repairs as required to achieve the desired watertightness. Upon completion of repairs, thoroughly clean and disinfect, if required, the affected areas. Repeat watertightness test until the above specified watertightness is achieved or Engineer's approval is obtained.

END OF SECTION 03300

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SECTION 03346

CONCRETE SLAB FINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1-16 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Finishing.
- B. Surface treatment with sealer and slip resistant coatings.

1.3 QUALITY ASSURANCE

- A. Comply with ACI 301.

1.4 COORDINATION

- A. Coordinate the Work with concrete floor placement and concrete floor curing.

PART 2 - PRODUCTS

2.1 SEALERS

- A. Sealer Type A: ASTM C309, clear, transparent, acrylic sealing compound with 30 percent minimum solids.
- B. Sealer Type B: Clear, penetrating liquid sodium silicate sealer.

2.2 SLIP RESISTANT TREATMENT

- A. Slip Resistant Finish: Natural aggregate, non-metallic dry-shake material.

PART 3 - EXECUTION

3.1 FLOOR FINISHING

- A. Trowel finish concrete floor surfaces in accordance with ACI 301, 11.7.3, Class A tolerances, unless subsequently specified otherwise. Bottom slabs of water containment structures and slabs on which backfill will be placed shall have floated finish as described in ACI 301, 11.7.2. Exterior concrete traffic surfaces shall have a non-slip broom finish as described in ACI 301, 11.7.4.

- B. Care shall be taken not to destroy the entrained air in the surface of the concrete in areas exposed to freezing and thawing. Concrete in liquid containment structures that are not enclosed in a heated structure are considered to be exposed to freezing and thawing.
- C. In areas with floor drains, maintain design floor elevation at walls; slope surfaces uniformly to drains as indicated on drawings.

3.2 FLOOR SURFACE TREATMENT

- A. Apply slip resistant finish on interior concrete stair treads and pedestrian ramps and all exterior stairs treads, platforms, landings, and pedestrian ramps. Apply at a rate of 25 pounds per 100 square feet. Imbed in concrete surface. Broadcast application is unacceptable.
- B. Apply sealer Type A on interior concrete surfaces subject to any foot or mechanized traffic. Surfaces shall receive an initial application after curing operations have been completed and a second application upon completion of construction and thorough cleaning.
- C. Apply sealer Type B on exterior concrete horizontal surfaces, not including bottom slabs of water containment structures unless noted otherwise. Sealer shall be applied in two applications three days apart and shall be rinsed off with water every 24 hours for two days after each application to wash away excess alkali and foreign matter which has migrated to the surface.

3.3 TOLERANCES

- A. Maximum Variation of Surface Flatness for Exposed Concrete Floors: 1/8 inch in 10 feet.
- B. Correct defects on surfaces intended to support floor covers by grinding. Correct defects in all exposed floors by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same tolerances.

END OF SECTION 03346

SECTION 03370
CONCRETE CURING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1-16 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Initial and final curing of horizontal and vertical concrete surfaces.

1.3 SUBMITTALS

- A. Submit proposed method of curing if differently than subsequently specified methods.

1.4 QUALITY ASSURANCE

- A. Comply with ACI 301 and ACI 302.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Membrane Curing Compound: ASTM C309, Type 1-D, Class B, clear with fugitive dye which disappears approximately 24 hours after exposure to sunlight; Spray-Cure Safe Cure Clear, Euclid Chemical Company Durez DR, or as approved. Curing compound shall be compatible with coatings (including sealer, waterproofing, bonded cementitious topping, or floor tile) which are to be applied to the concrete surface.
- B. Absorptive Mats: Burlap-polyethylene, minimum 8 oz/sq yd bonded to prevent separation during handling and placing.
- C. Water: Potable, not detrimental to concrete.

PART 3 - EXECUTION

3.1 HORIZONTAL SURFACES

- A. Cure floor surfaces in accordance with ACI 301 using any of the following accepted procedures.
 1. Spraying: Spray water over floor slab areas and maintain wet for 7 days.
 2. Absorptive Mat: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place for 7 days.
 3. Membrane Curing Compound: Pavement, walks, and curbs only.

3.2 VERTICAL SURFACES

- A. Cure surfaces using any of the following accepted procedures.
 - 1. Formwork: Keep forms in place for 7 days.
 - 2. Spraying: Spray water over surfaces and maintain wet for 7 days.
 - 3. Membrane Curing Compound.

3.3 PROTECTION OF FINISHED WORK

- A. Do not permit traffic over unprotected floor surface.
- B. When the mean daily outdoor temperature is less than 40 degrees F, Contractor shall, not less than 24 hours prior to placement, submit to Engineer for review arrangements for heating, covering, insulating or housing the concrete work, in accordance with ACI 301, 12.3.1.
- C. When the rate of evaporation of surface moisture from concrete as estimated from Figure 2.1.4 of ACI 305R-91, "Recommended Practice for Hot Weather Concreting", exceeds 0.15 lb/sq ft/hr, the measure of ACI 301, 12.3.2 shall be put into practice.

END OF SECTION 03370

SECTION 03410

PRECAST CONCRETE STRUCTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1-16 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes precast concrete structures and necessary appurtenances for the precast concrete structure installation.
- B. Related Sections include the following:
 - 1. Division 1 Section "Measurement and Payment" for schedule of unit prices.
 - 2. Division 2 Section "Trenching and Excavating for Utilities and Structures" for excavating, backfilling and shaping.
 - 3. Division 2 Section "Sanitary Sewers" for sewer installation

1.3 SUBMITTALS

- A. Product Data for the following:
 - 1. Precast Concrete Structures
 - 2. Manhole Rings and Covers
- B. Design Mix Reports and Calculations: For each class of concrete used to fabricate the precast concrete structures.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Precast sections may be provided with lifting notches on the inside face of walls to facilitate handling. Lifting notches shall not be more than 3 inches deep; holes extending through the wall will not be acceptable.
- B. Precast sections shall be handled carefully and shall not be bumped or dropped. Hooks shall not come in contact with joint surfaces.
- C. Precast sections shall not be delivered to the project site until the sections have attained a minimum strength of at least 80 percent of the specified design strength or a minimum of seven days whichever is greater.
- D. The date of manufacture shall be identified on all precast sections.

PART 2 - PRODUCTS

2.1 PRECAST STRUCTURES

A. Materials:

1. Concrete shall conform to ASTM C478 and the following:
 - a. Compressive Strength: 5000 psi minimum at 28 days
 - b. Air Content: 4 percent minimum
 - c. Alkalinity: Adequate to provide a Life Factor, Az = Calcium
 - d. Cementitious Materials: Minimum of 564 pounds per C.Y.
 - e. Coarse Aggregates: ASTM C33. Sound, crushed, angular granitic stone only. Smooth or rounded stone shall not be used.
 - f. Fine Aggregates: ASTM C33. Free from organic impurities.
 - g. Chemical Admixtures: ASTM C494. Calcium chloride or admixtures containing calcium chloride shall not be used.
 - h. Air Entraining Admixtures: ASTM C260
2. Reinforcing steel shall be ASTM A615 Grade 60 deformed bar, ASTM A82 wire or ASTM A185 welded wire fabric.
3. Lift loops shall be ASTM A416 steel strand. Lifting loops made from deformed bars are not allowed.
4. Flexible joint sealants shall be butyl rubber based conforming to Federal Specification SS-S-210A, AASHTO M-198, Type B - Butyl Rubber and as follows: maximum of 1% volatile matter and suitable for application temperatures between 10 and 100 degrees F.
5. Nonshrink grout interior patching of all penetrations shall be as follows:
 - a. Cormix Supreme
 - b. L & M "Crystex"
 - c. Masterbuilders "Masterflow 713 Grout" or "Set Grout"
 - d. Savereisen Cements "F-100 Level Fill Grout"
 - e. UPCO "Upcon Super Flow"
 - f. U.S. Grout "Five Star Grout"
6. Manhole rings and covers shall be equal to those shown on the plans and will conform to ASTM A48, Class 30B for gray cast iron materials. All castings shall be thoroughly coated with an asphaltic varnish and be as manufactured by:
 - a. Vulcan Foundry, Inc.
 - b. Neenah Foundry
 - c. U.S. Foundry and Manufacturing Corporation
7. Manhole steps shall conform to OSHA standards and shall be resistant to corrosion by hydrogen sulfide and other sewer gases. Steps shall be provided in bases, risers, cones, transition cones, and transition top sections aligned vertically on 16" centers. Steps shall be secured to the wall with a compression fit in tapered holes or cast in place. Steps shall not be vibrated or driven into freshly cast concrete or grouted in place. The steps shall be Copolymer Polypropylene Plastic reinforced with a 1/2" diameter grade 60 bar and have serrated tread and tall end lugs. Step pullout strength shall be 2000 lbs. minimum when tested according to ASTM C497.

B. Fabrication and Manufacturing:

1. Precast component fabrication and manufacturers shall conform to the following:
 - a. Precast manufacturing shall be in conformance with ASTM C478. Inside slab finishes resulting from casting against forms shall be free of any defects and honey comb. Exterior slab surfaces shall have a float finish. Small surface holes, normal color variations, normal form joint marks, and minor depressions, chips and spalls may be tolerated. Dimensional tolerance shall be those set forth in the appropriate references and specified below.
 - b. Joint surfaces between bases, risers, and cones shall be manufactured to the joint surface design and tolerance requirements of ASTM C361. The maximum slope of the vertical surface shall be 2 degrees. The maximum annular space at the base of the joint shall be 0.10". The minimum height of the joint shall be 4". Joint shall be smooth, uniform, and sharp edged.
 - c. Lift inserts shall be sized for a precision fit with the lift devices, shall comply with OSHA 1926.704, and shall not penetrate through the manhole wall.
 - d. Step holes shall be cast or drilled in the bases, risers, and cones to provide a uniform step spacing of 16" with the first step being 16" from the top of the cones. Cast step holes shall be tapered to match the taper of the steps.
2. Precast base sections shall be cast monolithically without construction joints.
3. Precast riser sections shall have a minimum lay length of 16".
4. Precast flat slab top sections shall have a manhole access with an inside diameter of 24" and shall be designed for HS-20 traffic loadings as defined in ASTM C890. Items to be cast into special flat slab tops shall be sized to fit within the manhole ID and the top and bottom surfaces.
5. Precast grade rings may be used to adjust ring and covers to finished grade. No more than 8 vertical inches of grade rings will be allowed per manhole. Grade rings shall conform to ASTM C478 and shall be no less than 4 inches in height.
6. Pipe to manhole connectors shall conform to ASTM C923.
7. Joints between precast components shall be sealed internally between the tongue and the groove and the following:
 - a. Internal seals shall consist of an o-ring gasket conforming to ASTM C443, installed according to the manufacturer's recommendation.
 - b. Internal seals may consist of a profile gasket conforming to ASTM C-443 and C-361, installed according to manufacturer's recommendation. Note: The Contractors may, at his option, use butyl rubber in addition to o-ring or profile gasket along the bottom groove of each section to help in sealing.
8. Lifting devices for handling precast components shall be provided by the precast manufacturer and shall comply with OSHA Standard 1926.704.

2.2 EPOXY COATING

A. Materials:

1. Epoxy coating materials shall be 100% solids, solvent free, two-component, high-build epoxy resin system. Material shall be Raven 405, or Engineer approved equal.
2. Epoxy coating materials shall have the following minimum requirements:
 - d. Solids Content (vol%) 100
 - e. Compressive Strength, psi (ASTM D579) 12,000
 - f. Tensile Strength, psi (ASTM D638) 7,600
 - g. Bond Strength-Concrete > Tensile Strength of Concrete

PART 3 - EXECUTION

3.1 GENERAL

- A. Care shall be taken in loading, transporting and unloading precast concrete structures. Structures shall be subjected to a careful inspection prior to installation. Any damaged area shall be repaired to the satisfaction of the engineer or removed from the project if damaged beyond repair at no additional cost to the owner.
- B. All precast structures shall be thoroughly cleaned before installation and kept clean until placed into service.
- C. Precast structures shall be installed where indicated on the construction drawings and in accordance with field staking cut sheets provided by the engineer.
- D. Contractor shall exercise extreme care when installing precast structures to protect existing underground utilities and existing structures from damage.

3.2 INSTALLATION

- A. All precast structures shall be provided with a uniform bed of granular backfill material, No. 57 stone, a minimum of 6" inches deep to fully support the precast structure. The bedding shall extend a minimum of 6 inches beyond the outside dimensions of the precast structure.
- B. Precast structures shall be set to be vertical and with sections in true alignment with a 1 inch maximum tolerance.
- C. Interior lift holes shall be plugged and grouted with materials specified in Part 2.
- D. Pipes shall be connected to precast structures and boots shall be tightened in accordance with manufacturer's recommendations. Non shrink grout shall be provided around pipe ends such that a uniform flow and constant grade through structures will be provided.
- E. O-ring rubber joints shall be provided at all joints to provide a watertight joint.
- F. All structures shall be set to top elevations shown on plans but in no event shall be less than 2 feet above finish grade.

- G. Vent piping shall be installed where indicated and to the elevations shown on the construction drawings.

3.3 TESTING

- A. The contractor shall perform a hydrostatic tightness test of the wetwell structure in accordance with ACI350.1. The acceptable leakage rate shall be 0.050%.
- B. The Contractor shall vacuum test all new sewer manholes for leakage in the presence of the Engineer.
- C. The Contractor shall furnish all labor, equipment, and any appurtenant items necessary to satisfactorily perform the vacuum test. All testing equipment shall be approved for vacuum testing manholes.
- D. A vacuum of 10 inches of mercury shall be drawn and the vacuum pump shut off. With the valves closed, the time for the vacuum to drop to 9 inches of mercury shall not be less than that shown in the table below:

Manhole Depth	Diameter of Manhole		
	48" Dia.	60" Dia.	72" Dia.
10 Ft. or Less	60 Sec.	75 Sec.	90 Sec.
>10 Ft. But <15 Ft.	75 Sec.	90 Sec.	105 Sec.
>15 Ft. But <25 Ft.	90 Sec.	105 Sec.	120 Sec.

(Times shown are minimum elapsed times for a drop in vacuum of 1 inch or mercury.)

- E. If the manhole fails the initial test, necessary repairs shall be made with an approved non-shrink grout while the vacuum is still being drawn. Retesting shall proceed and continue until a satisfactory test is accomplished.

END OF SECTION 03410

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SECTION 11050
RAW SEWAGE PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplementary Conditions (if included), and Division 1-16 Specifications Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Raw Sewage Pumps.
- B. Motor.
- C. Accessories.

1.3 QUALITY ASSURANCE

- A. Single Source Responsibility: In order to maintain a standard of compatibility, all pumps, motors, and control panels shall be provided by the same supplier:

1.4 PERFORMANCE REQUIREMENTS

- A. The pumps shall be furnished to meet or exceed the following performance parameters:
- B. Operating Conditions:
 - 1. Primary Design Condition:

Pump Flow in GPM:	100
Pump Discharge Pressure in TDH (FT):	45
2. Maximum pump speed (RPM)	3,600
3. Minimum pump efficiency (at Primary Design)	40 %
4. Minimum motor HP	5 HP (Non Overloading)
5. Minimum Pump shut-off head in TDH (feet)	80'

PART 2 - PRODUCTS

2.1 SUBMERSIBLE GRINDER SEWAGE PUMPS

- A. Pump Materials of Construction
 - 1. Pump Case: Cast Iron, ASTM A48, Class 30
 - 2. Motor Housing: Cast Iron, ASTM A48, Class 30
 - 3. Impeller: Semi-open, SST
 - 4. Discharge Base Elbow: Cast Iron, ASTM A48, Class 30
 - 5. Pump/Motor Shaft: 416 SST
 - 6. Cutting Mechanism: 440 SST, 58-60 Rockwell Hardness
 - 7. Power & Control Cord: S00W

8. Fasteners: 300 Series SST
 9. O-Rings: Nitrile Rubber (NBR)
 10. Mechanical Seals: Double Tandem Carbon and Ceramic
 11. Guide rails and mounting brackets: Stainless Steel, Type 304 (cables shall be nylon coated)
 12. Lifting Chain: Stainless Steel, ASTM A276 Type 304
 13. Oil-all uses (seal lubrication, etc): Ecologically safe, parifin or mineral base
- B. The contractor shall furnish and install a quantity of two submersible grinder or cutter type sewage pumps meeting the specifications described herein. Acceptable Manufacturers: Myers (Basis of Design), ABS, Tsurumi, KSB, or approved equal (approvals must be provided prior to bid).
- C. Provide pumps capable of handling raw unscreened wastewater. Design pumps to allow for removal and reinstallation without the need to enter the wet well and without removal of bolts, nuts or other fasteners. Provide a pump which connects to a permanently mounted discharge connection by simple downward motion, without rotation, guided by at least two non-load-bearing guides. For guide pipe systems, the pipe shall be supplied and warranted by the pump supplier. Intermediate guide supports (between upper bracket and discharge elbow connections) shall not be required for cable systems but MUST be supplied where needed to maintain perfect alignment for pipe guides. Final connection shall insure zero leakage between pump and discharge connection flange. Provide a discharge connection/ guide system so that no part of the pump bears directly on the floor of the wet well. Provide Type 304 stainless steel chain of sufficient length to properly and safely lift pumps from the wet well. All chain shall be properly sized to lift pumps supplied. All exposed cast iron and ferrous surfaces shall be cleaned of dirt and grease, sandblasted to near white finish, and coated with an anti-corrosion reaction primer. The pump shall then be coated with two-component thick coat paint, with an epoxy resin base, having at minimum 83% solids by volume. This coating shall be non-toxic and approved for both wastewater and water applications.
- D. Furnish major components (pump case, impeller, intermediate housing, motor housing) of cast material as specified with smooth surfaces devoid of blow holes and other irregularities. Pump case design shall incorporate a centerline discharge for stability when mounted on the base elbow.
- E. Provide grinder/cutter type impeller, capable of processing at minimum a 3" spherical solid. Statically and dynamically balance the impeller. On enclosed impeller designs, provide hard metal wear rings of material and Brinell hardness specified, to ensure maximum pump/impeller life and continuing high efficiencies. Impellers must incorporate back vanes which reduce axial loads and propel solids away from the seal area. Do not use soft metals (i.e. bronze, 304 or 316 stainless) or elastomers as wear ring material as these are incompatible with the grit contaminate expected in the pumpage.
- F. Provide common pump/motor shaft of sufficient size to transmit full driver output with a maximum deflection of 0.002 inches measured at the lower mechanical seal. Machine the shaft of carbon steel or Type 420 stainless steel.
- G. Provide two totally independent mechanical shaft seals, installed in tandem, each with its own independent single spring system acting in a common direction. Install the upper seal in an oil-filled chamber with drain and inspection plug (with positive anti-leak seal) for easy access from external to the pump. Provide seals requiring neither routine maintenance nor adjustment, but capable of being easily inspected and replaced. Provide seals which are non-proprietary in design, with replacements available from a source other than the pump manufacturer or its distributors.

- H. The pumps shall be driven by a completely sealed submersible squirrel cage induction motor of 5 horsepower, 1.15 service factor, 3,600 RPM, 1 phase, 60 hertz, 240-volt power. The motor shall be of non-overloading characteristics, and under no circumstances shall the brake horsepower exceed more than 90 percent of the motor horsepower rating at any point on the pump/impeller curve. The code letter of the motor shall be H or better. The contractor shall provide electrical equipment to be compatible with the pump chosen. Any deviation from 5 HP, 240V, 1PH shall be included in the contractor's lump sum price. This includes upsizing the generator, breakers, control panel, and all other components affected by the pump horsepower and electrical requirements.
- I. The motor shall be designed for continuous duty capable of ten (10) starts per hour.
- J. All hardware shall be stainless steel.
- K. Cable leads are to allow the connection of a cable to the motor, to be accomplished in the field without soldering cable. All leads are to be sealed and designed to prevent cable wicking to conduit box located on top of the motor. Cable entry shall be accomplished by a cylindrical elastomer grommet, flanked by two washers, closely fitted to the cable. A watertight seal shall be maintained by screwing a threaded cable entry gland into a cable inlet flange which bolts into the motor cap. The gland shall incorporate a strain-relief and anti-kink feature that shall function independently from the sealing action. Power and control cable leads are to be terminated with connectors secured to bronze lugs on an O-ring sealed terminal board. Stator and control leads from the motor are to be attached to the underside of these lugs. Motor shall be supplied with enough cable to reach the junction boxes (a minimum of 50') - feet of multi-conductor type "SOOW" or "W" power cable and control cable. Cable sizing shall conform to NEC specifications.
- L. Provide a detector in the motor's stator cavity which allows a control panel mounted relay to indicate leakage into the motor. In addition, on motors 80HP and larger provide a stainless steel float switch in a separate leakage collection chamber to indicate leakage past the inner mechanical seal prior to its entrance into either the motor stator cavity or the lower bearing. Electronic probes which depend on sensing resistance value changes in seal oil will not be acceptable as seal leak indicators.
- M. Furnish upper and lowering bearings, single row (preferred) or double row as needed to provide a L10 life of, at minimum, 100,000 hours at all anticipated axial and radial loadings. Provide permanently lubricated (but capable of being re-greased) bearings.
- N. Furnish temperature monitoring devices in motor windings for use in conjunction with and supplemental to external motor overload protection. Arrange controls to shut down pump should any of the monitors detect high temperature and automatically reset once motor temperature returns to normal. Set temperature monitors at levels recommended by pump manufacturer.
- O. A heavy-duty stainless steel lifting bail shall be included and be of adequate strength to lift the entire pump and motor assembly.

2.2 PUMP BASE ELBOW AND GUIDE RAIL ASSEMBLY

- A. Guide Rails and Bracket – Two rails shall be provided to guide the pump when being raised or lowered in the sump and mount on the discharge base elbow. Single rail or cable guide systems are not acceptable. The rails shall align the pump with the discharge elbow as it is lowered into place. A stainless steel upper rail guide bracket shall be furnished to support and align the rails at the top of the sump. For rail lengths greater than 20 feet, a stainless steel intermediate rail guide bracket shall be included.

- B. The sliding bracket assembly shall be a part of the pumping unit constructed so that when lowered to the discharge base/elbow, a tight seal is formed between the bracket assembly and discharge base/elbow.
- C. Discharge Base – The pump shall be mounted on a rigid discharge base-elbow to support the total weight of the pumping unit. The base is to be bolted directly to the floor with the 90 degree elbow having a 125 lb. ANSI flange discharging vertically.
- D. Provide stainless steel kellum grips and associated hooks/supports for power cable.
- E. The flanged base elbow kit shall be provided by the pump manufacturer.
- F. Finish coat pumps and base elbow with Amerlock 2 High Solids Epoxy Coating 12-16 mil minimum two coat dry film thickness, or equal.

2.3 PUMP CONTROL PANEL

- A. Control panel shall be furnished by pump supplier, with minimum of 10 years manufacturing experience.
- B. Control panel shall be operated using a five float system, as shown on drawings, with low level alarm, pump off, lead pump on, lag pump on, high level alarm inputs.
- C. Control panel shall have Hand-Off-Auto switches for each pump, pump running lights, and hour meters.
- D. Control panel shall have power on/power failure lights.
- E. Control panel shall be dead front type, in a NEMA 3R fiberglass enclosure with external alarm light and horn.
- F. Control panel shall have dry contact relays to provide alarm/running condition signals to SCADA panel.
- G. Control panel shall be UL Listed in accordance with local electrical codes, factory pre-wired.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Anchor pump base into concrete base pad.

3.2 MANUFACTURER'S START-UP SERVICES

- A. Follow Section 01650. After initial inspection, provide written deficiency list to Owner representative and Contractor. Repairs or adjustments shall be performed under representative's supervision.
- B. Provide a minimum of one 8 hour day of start-up service and 4 hours for the 12 month inspection.

PART 4 - WARRANTY

- 4.1 The pump manufacturer shall warrant the pump, motor and guide system to the Owner against defects in workmanship and materials for a period of one (1) years under normal use and service. Both pump manufacturer warranties shall be in published form and shall apply to all similar units. A copy of each warranty shall be provided to the Owner at startup.

END OF SECTION 11050

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SECTION 11070

ENGINE DRIVEN BACKUP PUMP

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplementary Conditions (if included), and Division 1-16 Specifications Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Engine Driven Backup Pump – Diesel.
- B. Accessories.

1.3 QUALITY ASSURANCE

- A. Single Source Responsibility: In order to maintain a standard of compatibility, pump, engine, and controls shall be provided by a single supplier.
- B. Equivalent Product: The basis of design for the engine driven backup pump is a Godwin Dri-Prime® CD80D (3) Three Inch skid Mounted Pump. Contractors may submit requests for approval of an “or-equal” pump manufacturer in accordance with the bid specifications, prior to the bid date. A blanket statement that equipment proposed will meet all requirements will not be sufficient to establish equivalence, but will require replay an explanation at each deviation or substitution.
- C. Interpretations: In order to be fair to all bidders, no oral interpretations will be given to any bidder as to the meaning of the specifications, documents or any part thereof. Every request for each a consideration shall be made in writing to the engineer. Based upon such inquiry, the engineer may choose to issue an Addendum.
- D. General Specifications: Units described shall be new, unused and of the current year’s production. The style of pump being bid must be in production for a minimum of 5 years. Documentation of similar installations must be provided during the “Or-Equal” approval process prior to the bid. Unit shall be of the latest design and in current production completely serviced, ready for work and shall include all standard and optional equipment as specified herein.
- E. Service Location: Pump manufacturers must have a fully stocked parts and service facility within 75 miles of the pump station. The engineer shall have the right to inspect the office and shall be the sold judge of its adequacy to fulfill this requirement.

1.4 PERFORMANCE REQUIREMENTS

- A. The pumps shall be furnished to meet or exceed the following performance parameters:

- B. Operating Conditions:
1. Primary Design Condition:
 - Pump Flow in GPM: 100
 - Pump Discharge Pressure in TDH (FT): 45
 - C. Maximum pump speed (RPM) 3000
 - D. Minimum pump efficiency (at Design) 40 %
 - E. Engine HP 20 HP (Non Overloading)
 - F. Minimum pump discharge 3"
 - G. Minimum pump suction 3"
 - H. Maximum suction lift (FT) 28'
 - I. Minimum Pump shut-off head in TDH (feet) 130' (At full speed)
- J. Pump shall operate automatically with the use of pump on/pump off floats set to elevations determined during start-up. Diesel pump shall controller shall also send pump run signal to SCADA panel for notification that back-up pump is in operation.

PART 2 - PRODUCTS

- 2.1 MANUFACTURERS: The contractor shall furnish and install a quantity of one diesel engine driven back up pump meeting the specifications described herein. Acceptable Manufacturers: Godwin CD80D or approved equal (approvals must be provided prior to bid).
- 2.2 CASING, SUCTION COVER, SEPARATION TANK: Pump castings shall be cast iron. Pump design shall incorporate a direct suction flow path that is in axial alignment with the impeller eye. There shall be no turns, chambers, or valves between the suction flange and the impeller eye.
- 2.3 IMPELLERS: The pump impeller shall be of open non-clog type with pump out vanes on the back shroud. The impeller shall be two-bladed of hardened cast chromium steel construction. Shrouded or semi-shrouded (non-clog) impellers will not be acceptable.
- 2.4 WEARPLATES: Shall be fully adjustable and replaceable, fabricated of cast iron. Wearplate clearances shall have no relationship to the ability of the pump to achieve a prime. The pump wearplates shall be of a diameter equal to or greater than the impeller diameter to insure maximum protection to the pump casing. Under no circumstances will wear rings be accepted.
- 2.5 BEARINGS AND SHAFTS: Pump shall be fitted with a bearing bracket which contains the shaft and heavy duty ball or tapered roller bearings of adequate size to withstand imposed loads. Minimum I.S.O. L10 bearing life to be 100,000 hours. Impeller shaft shall be of 1½% chromium alloy and have a minimum diameter of 60mm at the pump seal.
- 2.6 SEALS: Seals shall be high pressure, back to back double mechanical self-adjusting type with solid silicon carbide faces capable of withstanding suction pressures to 100 psi. The mechanical seal shall be cooled and lubricated in an oil bath reservoir, requiring no maintenance or adjustment. Pump shall be capable of running dry, with no damage, for periods up to 24 hours. All metal parts shall be of stainless steel. Elastomers shall be Viton.
- 2.7 PUMP SUCTION AND DISCHARGE FLANGES: Shall be cast iron ANSI (B16.1) Class 125, raised faced.
- 2.8 PUMP GASKETS: Shall be compressed fiber and/or Teflon.

- 2.9 PUMP O-RINGS: Shall be Viton.
- 2.10 PRIMING SYSTEM: Pump shall be fitted with a fully automatic priming system incorporating a twin-cylinder compressor and air ejector assembly. No vacuum pumps will be accepted. The compressor shall be installed on the engine auxiliary drive and shall be gear driven, lubricated and cooled from the engine. No water shall be required in the pump to achieve a prime. The air ejector shall operate on the discharge side of the compressor, eliminating the possibility of water being drawn into the air source. The pump must be capable of running totally dry for periods up to 24 hours. The priming system shall require no fail-safe protection float gear or any adjusting at high or low suction lifts. Pump to be fully automatic, needing no form of adjustment on priming system. The pump shall be capable of static suction lifts to 28 feet, vertical, at sea level. It shall also be capable of operation using extended suction lines.
- 2.11 CHECK VALVE: Pump shall be supplied with an integral flap check valve mounted on the discharge flange of the pump, allowing unrestricted flow into the impeller. The check valve shall prevent in-line return of flow when the pump is shut off. Non-return valve elastomers shall be Nitrile Rubber, and shall be field replaceable.
- 2.12 DRIVE UNIT: Diesel engine shall be water-cooled. Engine shall drive pump by use of direct connected intermediate drive plate. Starter shall be 12 volt electric. Safety shut down switches for low oil pressure, and high temperature shall be integral to the pump control panel. A tachometer, and hourmeter shall be integral to the pump control panel. Battery shall have 180 Amp hour rating. Unit shall be a John Deere 6068T or equal, rated at 139 hp (continuous) at 2,000 RPM. A certified continuous duty engine curve shall be supplied to the owner/engineer.
- 2.13 GOVERNOR: Governor shall be electronic type. Engine speed shall be adjustable to operate the pump between maximum and minimum design operation speeds.
- 2.14 EXHAUST: Exhaust system shall include a hospital grade muffler housed in a separate chamber within the enclosure. All exhaust piping and manifolds shall be encased in fitted acoustic blankets. They shall be constructed of high-density fiberglass material with waterproof jacketing.
- 2.15 SOUND ENCLOSURE: The engine and pump shall be completely enclosed with sheet metal panels backed with one inch and two-inch layers of polydamp acoustical sound-deadening material. The acoustical enclosure shall reduce pump and engine noise to sixty-eight dBA or less at a distance of thirty feet. The enclosure shall be removable for easy access to the engine / pump for maintenance and repair. The enclosure doors shall all be equipped with latches that are keyed alike. For maintenance and service needs, the enclosure sides shall have hinged doors for quick access to the engine oil fill, fuel fill port, oil dipstick, and filters.
- 2.16 FACTORY PAINTING: Pump, engine, base, and trailer shall be shop primed and finish painted at the place of manufacturer. Materials and thickness for priming shall be in accordance with manufacturer's standards.
- 2.17 SKID BASE:
- A. The pump base tank shall be a UL-142 approved double wall design constructed in accordance with Flammable and Combustible Liquids Code, NFPA 30; The Standard for Installation and use of Stationary Combustible Engine and Gas Turbines, NFPA 37; and The Standard for Emergency and Standby Power Systems, NFPA 110.
 - B. The tank design shall be a Closed Top Dike Pump Base Tank. It shall be of double wall construction having a primary tank to contain the diesel fuel, held within another tank or dike, which is intended

to collect and contain any accidental leakage from the primary fuel tank. The completed base tank assembly is to incorporate pump mounting locations and must be able to support four times the rated load.

- C. The primary tank shall be designed to withstand normal and emergency internal pressures and external loads. It shall be capable of withstanding internal air pressures of 3 to 5 psig without showing signs of excessive or permanent distortion and 25 psig hydrostatic pressure without evidence of rupture or leakage.
- D. The primary and secondary tanks or dike shall have venting provisions to prevent the development of vacuum or pressure capable of distorting them as a result of the atmospheric temperature changes or while emptying or filling. The vent shall also permit the relief of internal pressures caused by exposure to fires. The vent size shall be determined by using the calculated wetted surface area in square feet (the top is excluded) in conjunction with venting capacity table 10.1 of UL-142. The tank's vent shall also be equipped with a coupling device and shall be located to facilitate connection to a vent piping system. The dike's vent may be an opening for venting directly to the atmosphere and protection from the entrance of natural elements or debris shall be provided.
- E. The primary tank is to be constructed of 7 gauge ASTM A569 or A-36 hot rolled steel. Internal baffles or reinforcement plates shall be located on a maximum of 24 inch centers in tanks up to 60 inch width and on a maximum of 19.5 inch centers in tanks over 60 inch width. At least one baffle shall separate the fuel suction pipe from the fuel return line.
- F. The outer tank is to be constructed in a manner to be able to support four times the wet load of the pump and housing. All of the load is to be carried by the outer tank so no load or vibration stress is placed on the primary tank. If the pump base tank is wider than the pump set to be supported, structural rails are to be incorporated to span the width of the base tank so that the load is transferred to the side rails of the tank. Vertical reinforcements shall be welded to the outer sides of the secondary tank or dike at a maximum of 45-inch centers on tanks up to 30 inches high and on 24-inch centers on tanks greater than 30 inches high. At least one vertical reinforcement shall be positioned adjacent to each mounting hole location.
- G. Both primary and secondary tanks shall be fitted with the proper welded pipe fittings to accommodate the requirements for the fill port and normal and emergency venting.
- H. The completed assembly is to be cleaned with a heated pressure wash followed by a chromium free post treatment to ensure proper paint adhesion. The tank assembly is to be painted with an epoxy ester primer and high quality polyurethane enamel with total paint thickness of 3.5 mils. The painted tank assembly is to be baked at 180 degrees for 30 minutes to provide a hard durable finish.
- I. Manufacturing and testing of this system shall be performed within the scope of Underwriters Laboratories, Inc. "Standard for Safety UL 142." A UL label shall be permanently attached to the tank system showing the following information:
 - 1. The registered UL mark and the name: Underwriters Laboratories, Inc.
 - 2. A control number and the word "listed"
 - 3. The product's name as identified by Underwriters Laboratories Inc.
 - 4. The serial number assigned by Underwriters Laboratories, Inc.
 - 5. Other manufacturer's information may also be included.

2.18 AUTOMATIC STARTING CONTROL SYSTEM:

- A. The engine shall be equipped with a factory installed PrimeGuard microprocessor-based controller as supplied by Godwin Pumps of America, Inc. and designed to start/stop the engine at a signal supplied by high and low level floats or a 4-20 mA transducer.
- B. The engine shall be started, stopped, and controlled by a PrimeGuard high performance state of the art digital controller as supplied by Godwin Pumps of America, Inc. The controller shall be weather proof enclosed, and contain an external weatherproof 12-position keypad accessible without the need to remove or open any protective cover or enclosure. It shall be designed to start/stop the engine at a signal supplied by high and low level floats or a 4-20 mA transducer. The PrimeGuard controller shall provide the following functions without modification, factory recalibration, or change of chips or boards, by simply accessing the keypad.
- C. The keypad shall be a capacitive touch sensing system. No mechanical switches will be acceptable. The keypad shall operate in extreme temperatures, with gloves, through ice, snow, mud, grease, etc. and maintain complete weather-tight sealing of the PrimeGuard controller.
- D. In automatic mode, the unit shall conserve energy and go to “sleep”.
- E. The PrimeGuard controller shall function interchangeably from a submersible level transducer, as well as manual start/stop by selection at the keypad. No other equipment or hardware changes are required.
- F. The PrimeGuard controller shall be capable of varying the engine speed to maintain a constant level in a process without a change to the controller other than via the keypad.
- G. The start function can be programmed to provide three separate functions each day for seven days (i.e. a start, warm up, exercise cycle on two separate days at different times and for a varying length of time all via the keypad).
- H. In Manual Mode, manual “Start” button starts engine and runs until “Stop” button is depressed or an emergency shutdown occurs.
- I. In Automatic Mode, start/stop sequencing is initiated by either one (1) high-level N/O and one (1) low-level N/C narrow angler float switches, pressure switch, transducer, or a signal from a digital input.
- J. The controller shall integrate the engine safety shut-off for low and high oil temperature, and provide over-speed protection.
- K. The controller shall include standard, field-adjustable parameters for engine cycle crank timer, shutdown time delay, warm-up time delay, and cool-down time delay.
- L. The Prime Guard Panel shall have only one circuit board with 8 built in relays. Each relay can be named to provide any function all via the key play without changing relays, chips, printed circuits or any hardware or software.
- M. Standard components shall consist of (24) digital inputs, (7) analog inputs, (1) magnetic pick-up input, (8) 20-amp form “C” relays, (1) RS232 port, (1) RS485 port, (1) RS232/RS485 port, (1) J1939 port, and (1) 64X128 pixel full graphic LCD display with backlight.
- N. The industrially-hardened PrimeGuard Controller shall withstand Vibration of 3 g, 3 axis, frequency swept 10-1000 Hz, in an operating temperature Range of 4° to 176°F (-20° to 80°C) and an operating humidity range of 0-95% Non-Condensing.

- 2.19 THERMOSTATICALLY CONTROLLED ENGINE BLOCK HEATER: The drive unit shall be supplied with a thermostatically controlled engine coolant heater (20-amp, 115 VAC required).
- 2.20 INTERNAL LIGHT: The unit shall include one (1) switch operated internal 12VDC powered light.
- 2.21 FULLY AUTOMATIC TRICKLE CHARGER: The unit shall include a fully automatic trickle charger powered by 6-amps, 110 VAC. It shall be hard-wired into the junction box within the enclosure.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.2 MANUFACTURER'S START-UP SERVICES

- A. Follow Section 01650. After initial inspection, provide written deficiency list to Owner representative and Contractor. Repairs or adjustments shall be performed under representative's supervision.
- B. Provide a minimum of one 8 hour day of start-up service and 4 hours for the 12 month inspection.

PART 4 - WARRANTY

- 4.1 The pump manufacturer shall warrant the pump, motor and guide system to the Owner against defects in workmanship and materials for a period of one (1) years under normal use and service. Both pump manufacturer warranties shall be in published form and shall apply to all similar units. A copy of each warranty shall be provided to the Owner at startup.

END OF SECTION 11070

SECTION 16000
ELECTRICAL - GENERAL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section of the specifications includes the furnishing and installation of all labor, materials, tools, equipment, and operations necessary for the proper execution and completion of all electrical work indicated on the drawings and specified herein.
- B. The Contractor shall furnish and install all conduit, cable, systems for power, and shall furnish and install raceways for special systems as specified herein and as indicated on the electrical drawings, complete and ready to operate in every respect, including connection of Owner furnished equipment, if applicable.

1.2 CODES & ORDINANCES

- A. All electrical work and materials shall comply with the National Electrical Code (NEC), the National Electrical Safety Code (NESC), American Society for Testing and Material (ASTM), Insulated Cable Engineers Association (ICEA), National Electrical Manufacturers Association (NEMA), National Fire Protection Association (NFPA), Underwriters' Laboratories (UL) and applicable local codes and regulations.
- B. All electrical equipment shall be third party listed as required by the State of North Carolina.
- C. If discrepancies occur between laws, codes, ordinances, rules and regulations, and the specifications or drawings, each discrepancy shall be called to the attention of the Engineer in writing before the bids are submitted. That work which is shown or specified in violation of these rules and regulations shall be done in compliance with the regulations, and no claim for additional cost required to make implied systems complete will be accepted.

1.3 UTILITY COORDINATION, PERMITS AND FEES

- A. The Contractor shall coordinate power service modifications with the local power utility and provide equipment in full conformance with their requirements.
- B. The Contractor shall notify the utility to provide new services indicated on the drawings.
- C. The Contractor shall obtain all permits and inspections required for the completion of this contract.

1.4 WORKMANSHIP

- A. Workmanship in the fabrication, preparation, and installation of materials and equipment shall conform to the best standards of practice of the trades involved. Experienced and skilled electricians and mechanics under the supervision of a competent foreman shall perform work. Substandard workmanship will be cause for rejection of work and replacement by Contractor.

1.5 DRAWINGS AND SPECIFICATIONS

- A. The drawings show the location and arrangement of conduits, ducts, and equipment, together with details of connections of certain principal items. The layout shown shall be followed as closely as circumstances will permit, but the Contractor shall lay out his work so as to avoid conflict with other contractors and trades, and to avoid any unnecessary cutting or damage to walls, floors, and supporting structural members. The Contractor shall install at the proper time all necessary sleeves, hangers and inserts that will be required for the completion of his work and shall be solely responsible for the accurate and proper location of the above items.
- B. The Contractor shall refer to the general drawings and cooperate fully with other contractors and trades while installing electrical equipment because of close space limits. In case of conflict, the Engineer shall be notified before proceeding with installation.
- C. The drawings and specifications complement each other and together are intended to give a complete description of the work. Any item of equipment or note of work to be done as shown on plans and not mentioned in the specifications, or mentioned in specifications and not shown on plans, shall be furnished the same as if mentioned or shown in both places. If conflicts exist, then the most stringent method shown or described should apply.
- D. Any discrepancy, omission, or conflict found in plans or specifications shall be called to the immediate attention of the Engineer, prior to receipt of bids.
- E. The drawings are not intended to show complete details. It is the Contractor's responsibility to comply with the evident intent for centering and symmetric arrangement. The Contractor shall take all field measurements and be responsible therefore. Exact locations are to be defined in the field.

1.6 CUTTING AND PATCHING

- A. The Contractor shall do any cutting of walls or structures required for the installation of work under this section. Holes through walls for passage of conduits shall be properly and neatly sleeved and grouted. Sleeves through exterior walls shall be effectively sealed against passage of water. All disturbed areas shall be refinished and left in a finished and matching condition and shall meet the approval of the Engineer.

1.7 ALLOWANCE FOR ADDITIONAL WORK

- A. Before proceeding with any work for which compensation may be claimed or the Owner may claim credit, a detailed estimate shall be submitted and approved in writing. No claim for addition to the contract will be valid unless so ordered and approved by the Owner and Engineer.

1.8 AS INSTALLED PRINTS

- A. The Contractor shall maintain a set of prints, showing exact location of all relocated equipment, concealed equipment, service accesses, hand holes, underground duct banks, and all other changes to the plans. This set of prints shall be kept current and turned over to the Engineer upon completion of the job. Dimensions shall be shown to locate all underground conduit duct banks from permanent reference points.

1.9 INCIDENTAL CONSTRUCTION WORK

- A. The Contractor shall provide all openings as required for the electrical work. The Contractor shall do all cutting and fitting of his work and of other work that may be required to make the several

parts come together properly and to fit his work to receive or be received by the work of other Contractors as shown upon, or reasonably implied by the drawings and specifications. He shall properly complete and finish up his work after other contractors have finished as the Engineer may direct. All excavating required for the installation of the system shall be done by the Contractor. Backfill shall be accomplished as specified in the appropriate section of the specifications.

1.10 CLEANING AND PAINTING

- A. The Contractor shall at all times keep the Owner's premises, adjoining driveways and streets clean of rubbish caused by the Contractor's operations and at the completion of the work shall remove all the rubbish from and about the premises, all his tools, equipment, temporary work, surplus material and shall leave the area clean and ready for use.
- B. The Contractor shall be required to perform touch up painting on factory-finished equipment installed under this contract where necessary to repair damaged areas. All metal exposed to weather shall be properly painted. Any equipment installed where exposed to weather shall have all damaged areas cleaned, primed, and painted by the Contractor.

1.11 GUARANTEE

- A. The Contractor shall guarantee all materials, equipment, and workmanship in this contract against defects and failures of any nature for a period of one year from date on which the system is accepted. Apparatus furnished by the Contractor shall be guaranteed to be satisfactory when operated under rated conditions in accordance with manufacturer's instructions and to be of size, function, and capacity as indicated on the drawings or in the specifications. Upon notice from the Engineer or Owner, the Contractor shall immediately check the system, make necessary repairs or adjustments as required due to faulty workmanship, materials, faults, operation, or equipment, without cost to the Owner, and instruct the Owner in proper operation, adjustment, and care of the systems.

1.12 IDENTIFICATION

- A. All equipment shall be identified and properly marked. All marking must meet the Engineer's approval. All markers shall be of appropriate size. Each panel, transformer, contactor, starter, and other piece of electrical equipment shall be identified as to their service.
- B. All disconnect switches, junction boxes, motor controllers, and other equipment requiring electrical owner connection shall be marked with voltage present, as appropriate to designate 120, 208, 240, 277, or 480 volts and single or three-phase, as applicable.

1.13 MAINTENANCE AND OPERATING INSTRUCTIONS

- A. The Contractor shall furnish to the Engineer five (5) complete sets of applicable drawings, instructions and parts lists on all equipment furnished, providing names and addresses of manufacturers or subcontractors and suppliers. Two (2) copies of manufacturer's warranties on all equipment shall be provided to the Owner and one (1) copy to the Engineer.
- B. The one-year warranty period on all equipment and systems installed by this Contractor shall start upon final approval and acceptance following the installation and commissioning of the equipment.

1.14 SHOP DRAWINGS

- A. Upon award of the contract, the Contractor shall submit to the Engineer for approval, a list of all proposed subcontractors and materials he proposes to utilize and five (5) sets of shop drawings

consisting of detailed drawings or manufacturer's cuts of all manufactured equipment he proposes to use on the job. The drawings or cuts shall show details of construction and arrangement of all pertinent data pertaining to equipment proposed to be furnished. Where manufacturer's cut sheets include more than one option or model number, the Contractor must clearly indicate the proposed option or model number. The approval of the Engineer shall be obtained before equipment is ordered for delivery. It will be the duty of the Contractor to verify quantities, dimensions, and details, and determine suitability of equipment for installation in space provided. Approval of shop drawings by the Engineer does not relieve the Contractor of the responsibility for coordination, dimensions, quantities, or conformance with contract documents.

- B. The Contractor shall check and initial shop drawings making such notations and corrections as may be appropriate or necessary to comply with contract documents before submission to the Engineer.

1.15 STORAGE AND PROTECTION OF MATERIALS AND EQUIPMENT

- A. The Contractor shall be responsible for furnishing suitable shelter and protection for all materials and equipment stored on the job. Equipment shall be protected from damage from any source both during storage and after installation until completion of the job. No damaged equipment will be accepted. Existing equipment removed from service shall be protected from damage and loss of parts until turned over to the owner.

PART 2 - MATERIALS

2.1 ELECTRICAL MATERIALS AND METHODS

- A. Materials and workmanship on all work installed under this contract shall be new and of the best quality and shall conform to the best practice for such work and be installed in accordance with manufacturer's recommendations and instructions, including all hardware and accessories recommended or appropriate. Any work or materials not specifically mentioned in these plans and specifications, but required to make this job a complete and workable system shall be furnished and installed by the Contractor.
- B. Substitution for equipment specified must be equal in every respect and the Contractor shall base his proposal on the quality of materials and equipment covered in these specifications and shown on the drawings.
- C. Where substitutions alter the design or space requirements indicated on the plans, the Contractor shall include all items of cost for the revised design and construction, including the cost of any changes or modifications in structural or mechanical details and electric service resulting from substitution of electrical equipment, and the cost of all allied trades involved.
- D. All manufactured and fabricated assemblies of electrically operated equipment furnished under this contract shall have Underwriter's Laboratories approval or UL Re-examination listing in every case where such approval has been established for the particular type of materials or devices in question.

2.2 CONDUCTORS AND RACEWAYS

- A. All wiring shall be in conduit or other approved raceways except as shown on the drawings or otherwise specified, and shall be concealed unless otherwise noted. Conduit shall be one of the types listed below.

B. Conduit Types:

1. PVC Coated Rigid Steel Conduit. The conduit shall be rigid steel, hot dip galvanized, with a 40-mil thick PVC coating on the pipe outer diameter and a 2-mil thick PVC coating on the pipe inner diameter. PVC coated rigid steel conduit shall be as manufactured by Ocal, Perma-Cote, or Robroy Industries.
2. Rigid Steel Conduit. Rigid steel conduit shall be heavy wall, hot dip galvanized, and shall conform to Fed Spec WW C 581, ANSI C80.1, and UL 6.
3. Rigid PVC Conduit. The conduit shall be Schedule 80 PVC, 90 deg C rated conforming to NEMA TC-3 and UL514, 651. Conduit shall be as manufactured by Carlon, Indian head, Robroy, Ocal or equal.
4. Rigid Aluminum Conduit (RAC). Rigid aluminum conduit and fittings shall be manufactured of 6063 T1 alloy. Rigid aluminum conduit shall be UL approved and shall conform to Fed Spec WW C 540 and ANSI C80.5.
5. Liquid Tight Flexible Metal Conduit. Liquid tight flexible metal conduit shall be hot dip galvanized steel, shall be covered with a moisture proof polyvinyl chloride jacket, and shall be UL labeled.

C. Conduit Installation:

1. Rigid steel conduit shall be installed in masonry walls, concrete slabs, and cast-in-place walls.
2. Intermediate and rigid steel conduit shall be rigidly supported by hot-dip galvanized hardware and framing materials, including nuts and bolts. Terminations and connections shall be taper threaded. Conduits shall be reamed, free of burrs, and terminated with conduit bushings.
3. PVC coated rigid steel conduit shall be installed in exposed outdoor locations and where indicated on the drawings. PVC-coated mounting hardware and framing materials shall rigidly support conduit. Nuts and bolts shall be stainless steel. All damaged coatings shall be repaired according to the manufacturer's instructions. PVC coated rigid steel conduit shall be threaded and installed as recommended by the conduit manufacturer. Threading tools used for steel conduit shall not be used to thread PVC coated rigid steel conduit.
4. Liquid tight flexible metal conduit with watertight connectors shall be installed for final connections to dry type transformers, motors, equipment with moving parts, and where indicated on the drawings. Conduit shall be installed without sharp bends and in minimum lengths required for the application but not longer than 4'-0", unless acceptable to the Engineer.
5. Unless otherwise noted or required by Code, direct buried underground conduit shall be PVC schedule 80. Turn-ups outdoors shall be PVC coated rigid steel. Conduit in classified locations shall be PVC coated rigid steel.
6. Underground conduits shall be concrete encased under roadways and where indicated on the drawings.
7. Locknuts inside and outside shall securely fasten conduit connections to sheet metal enclosures. Conduits shall be installed between the reinforcing steel in walls or slabs that

have reinforcement in both faces. In slabs that have only a single layer of reinforcing steel, conduits shall be placed under the reinforcement. Conduit shall be neatly grouted into any openings cut into concrete and masonry structures. Conduits shall be capped during construction to prevent entrance of dirt, trash, and water.

8. All conduits that enter enclosures shall be terminated by fittings that ensure that the NEMA rating of the enclosure is not affected or changed. A corrosion resistant coating shall be applied to all conduits that turn out of concrete, masonry, or earth indoors. The coating shall consist of a heavy coat of thixotropic coal tar paint extending six inches on each side of the point of turnout.
9. Concrete encased conduit shall have minimum concrete thickness of 2 inches between conduits, six inches above and below conduits. Underground conduit bend radius shall be not less than 2 feet at vertical risers or less than 3 feet elsewhere. Underground conduits and conduit banks shall have 2-foot minimum earth cover except where indicated otherwise. Underground conduits shall be sloped to drain to the handholes.
10. After cable has been installed and connected, conduit ends shall be sealed by non-hardening duct sealing compound forced into conduits to a minimum depth equal to the conduit diameter. This shall apply for all conduits at handholes and building entrance junction boxes, and for all conduit connections to equipment.
11. All exposed conduit runs shall be so located that pull or junction boxes will not be made inaccessible due to inadequate clearance with piping or equipment.
12. All conduits used for service entrance feeders from supply point to first overcurrent device shall be bonded with suitable bonding locknuts and/or bonding insulating bushings, or by separate copper bonding conductor.

2.3 CONDUCTORS

A. General:

1. Contractor shall furnish and install all wire and cable necessary to complete the work herein outlined and as shown on drawings, except such items as are specifically noted as being furnished by others. All wiring in the entire system must be color-coded and all conductors shall have their size, voltage, manufacturer, and type clearly marked on the outer covering. All wire and cable shall be as herein specified or as shown on the drawings. Wire and cable shall be manufactured by Okonite, Belden, Anaconda, Rome, General Cable, or equal.

B. Power Conductors:

1. Conductors shall consist of annealed copper wire of size indicated on drawings or as may be specified herein. No conductors smaller than #12 AWG copper shall be used unless otherwise indicated on the drawings. All conductors #12 AWG and larger shall be of Class B concentric stranded construction, unless specified otherwise herein or on drawings.
2. All wire and cable unless otherwise specified shall be single conductor type THWN or THHN 600-volt insulation. Service entrance conductors shall be RHH/RHW-USE type insulation. Conductors shall be color coded as follows:
 - a. black, blue, red, white, and green on 120/208 volt wye systems
 - b. black, orange, red, white, and green on 120/240 volt delta systems
 - c. brown, orange, yellow, gray, and green on 277/480 volt wye systems.

C. Installation:

1. The Engineer reserves the right to inspect any and all joints in wiring. If the joint is already taped, the Contractor shall properly re-tape after inspection. Conductors shall be continuous without joints or splices in runs between outlet boxes. All splices shall be made at boxes only.

D. Splices and Terminations:

1. Splices shall be made by use of mechanical connectors of the following manufacturers' types, T & B Sta Kon, Burndy Crimpit, Minnesota Mining and Manufacturing Company Scotchlock, and Ideal Wire-Nut. Conductors size #8 AWG and larger shall be spliced and connected with suitable, solderless, mechanical lugs and connectors. All splices, taps, and connections shall be insulated with Scotch electrical tape as made by Minnesota Mining & Manufacturing Company as applicable to installation.

E. Instrument Cable.

1. Cable for electronic circuits to instrumentation, metering, and other signaling and control equipment shall be two- or three-conductor instrument cable twisted for magnetic noise rejection and protected from electrostatic noise by a total coverage shield. Cable shall be used where indicated on the drawings.

2.4 SUPPORTING DEVICES

A. General:

1. All secondary electrical devices such as outlet boxes, poles, bases, switches, and receptacles shall be located generally as shown on the drawings. No device utilized by the handicapped shall be located higher than 4' 0" from the finished floor level to the top of the device.

B. Outlet and Switch Boxes:

1. Boxes exposed, in masonry walls and cast-in-place walls shall be cast metal, malleable, with conduit hubs, Crouse Hinds, Appleton or equal. Intermediate oversize type cover plates shall be used where standard cover plates will not cover opening. All adjacent plates shall match in material, size, design, and color.
2. All exterior mounted boxes shall have approved weatherproof plates and in-use covers.

C. Outlet Locations:

1. All outlets for receptacles or switches shall be installed in the location indicated on the drawings. When necessary, the Contractor shall relocate outlets to coordinate with other equipment.
2. Unless otherwise indicated on the drawings, electrical devices shall be placed at the following distances from finished floors:
 - a. Light Switches – center of switch 45" above finished floor (45" AFF).
 - b. Duplex receptacles – center of receptacle 18" above finished floor (18" AFF).
 - c. Power Panelboards top of cabinet 6' 6" above finished floor.
 - d. Safety switches and/or circuit breakers handle not over 6' 6" above finished floor.

3. The Electrical Contractor is cautioned to review general drawings to confirm location of equipment and to adjust the exact installed location of receptacles and devices accordingly to avoid interference between electrical devices and equipment. Responsibility for locating devices in the field is the Contractor's. The Engineer should be contacted for clarification before installation.

D. Structural Steel:

1. The Contractor shall provide miscellaneous structural steel necessary to mount electrical equipment to walls, beams and joists. All structural steel furnished shall be standard shapes and sizes and shall be stainless steel. All interior steel shall be firmly and rigidly welded or bolted in place. All structural steel shall be structural quality conforming to ASTM A7 497.

E. Tap and Pull Boxes:

1. Boxes shall be of code gauge galvanized sheet steel but not less than 14-gauge metal. Holes for raceways shall be drilled on the job. Where necessary for boxes to be supported away from the ceiling or beams, strap iron or threaded rod shall be used for supports. Outdoor boxes shall be NEMA 4X stainless steel unless otherwise noted.
2. Boxes shall have covers fastened on with screws. Sizes of boxes shall be determined by NEC requirements.

F. Secondary Systems:

1. The Contractor shall furnish and install all conduit, junction boxes, outlet boxes, and plates for conduit systems as indicated on the drawings.

2.5 GROUNDING

- A. All electrical systems and equipment connected under this contract shall be grounded in strict accordance with the National Electrical Code and state and local regulations. Provide a green insulated equipment grounding conductor in all conduits. It is intended that equipment grounding is not dependent on conduit connections.
- B. Metal raceways, metal enclosures or electrical devices, switchgear enclosures, transformer frames, and other equipment shall be completely grounded in an approved manner prescribed by the NEC. All necessary conduit, conductors, clamps and connectors for the grounding system shall be furnished, installed and connected by the Electrical Contractor. The service shall be grounded as indicated on the drawings and as required by the NEC. Ground connections to water pipes shall consist of a ground fitting that bonds both conduit and conductor to the pipe.
- C. All grounding conductors shall be bare or green insulated in accordance with the National Electrical Code, soft drawn copper cable or bar, not smaller than 12 AWG. Ground cable splices and joints which will be inaccessible upon completion of construction shall meet the requirements of IEEE Standard 837, and shall be Cadweld "Exothermic" or Burndy "Hyground" type. Ground cable near the base of a structure shall be in earth and as far from the structure as the excavation permits but not closer than 6 inches.
- D. Ground connections to equipment and ground buses shall be by copper or high conductivity copper alloy ground lugs or clamps. Connections to enclosures not provided with ground buses or ground terminals shall be by clamp type lugs added under permanent assembly bolts or under new bolts drilled and added through enclosures or by grounding locknuts or bushings.

- E. Ground rods not described elsewhere shall be 5/8-inch diameter by 8 feet long, with a copper jacket bonded to a steel core.

2.6 LUMINARIES

- A. The Contractor shall furnish and install all lighting fixtures as called for on the drawings or as herein specified. All fixtures shall be new, industrial grade, and as specified on the drawings.
- B. LED 6000k vapertite cover, 4' long and shall be electronic, premium grade, approved by Underwriters' Laboratories, and properly applied for each installation.
- C. The neutral conductor of lighting systems must be of the same size as the other conductors or larger. On three wire systems, the load shall be divided as evenly as possible on each "outside" or phase conductor. Neutral conductors shall be identified throughout.
- D. The Contractor shall furnish and install all lamps required for all fixtures. All lamps shall be of size and type specified; manufactured by General Electric, Westinghouse, or Sylvania. Fluorescent lamps shall be cool white. All lamps shall be warranted by the Contractor for the published rated life. Four weeks after acceptance of the system, the Contractor shall check all lighting fixtures and replace lamps and/or ballasts that have failed during this period of time.

2.7 SWITCHES

- A. Wall switches specification grade and shall be 20 amperes, 120/277 volts, Arrowhart 1221 through 1224, Hubbell 1221 through 1224, Eagle 1221 through 1224, or equal and shall be mounted 3'-6" AFF unless otherwise indicated on the drawings.

2.8 RECEPTACLES

- A. Receptacles shall be specification grade, duplex, three wire, grounding, 20 amperes, 125 volts, Arrowhart 5362, Hubbell 5362, Eagle 5362, or equal for 120-volt circuits. Ground fault receptacles shall be duplex, 20 amperes, 125 volts, Arrowhart GF5352, Hubbell GF5352, Eagle GF5352, or equal. Generator inlet twist-lock receptacles shall be: 30A Angle Twist-Lock Receptacle 3P 4W 250VAC L15-30R GY or owner approved equivalent. Receptacles shall be mounted 36 inches AFF unless otherwise indicated on the drawings.

2.9 CIRCUIT BREAKER TYPE DISCONNECT SWITCHES

- A. Unless otherwise specified, each circuit breaker type disconnect switch shall be 3 phase, heavy-duty, with a voltage and continuous current rating as indicated on the drawings.
- B. Each disconnect switch shall have an enclosure rating as indicated on the drawings.
- C. The disconnect switch for the primary service shall be service entrance rated.
- D. The disconnect switch for the generator shall be provided with insulated neutral terminals.
- E. Circuit breakers shall be 3 phase, 480 volt, molded case circuit breakers of not less than 42,000 amperes interrupting rating at 480 volts ac, complete with thermal and instantaneous trip elements. Breakers shall be manually operated with quick make, quick break, trip free toggle mechanism. Bimetallic thermal elements shall withstand sustained overloads and short circuit currents without injury and without affecting calibration. Circuit breakers shall have "On", "Off", and "Tripped" indication and padlockable handles.

- F. Disconnect switches shall have nameplates identifying related equipment, and unit numbers where applicable. Nameplates shall be laminated black over white plastic, with 1/8-inch engraved letters, and shall be securely fastened to the enclosure.

2.10 POWER PANELS (PP)

A. Required Power Panels:

- 1. For Pump Station - 120/240 Vac, 1 Phase, 100A: NEMA 3R

- B. Unless otherwise specified, each power panel with neutral shall be dead front, circuit breaker, 1 phase, panel-board type in accordance with the drawings and the following.
- C. The panel shall have a flush-mounted or surface-mounted enclosure with a NEMA type enclosure designation as required by the location where it will be installed. The enclosure shall have a door with latch and lock. A directory inside the door shall have a panel and all circuit identities neatly typewritten at completion of the contract.
- D. A ground stud bolt shall be provided through the cabinet, with a removable 1/0 AWG bond to the panel ground bus and an external clamp connector for a station ground cable.
- E. Circuit breakers shall be thermal magnetic, bolt in, individually front replaceable, and shall indicate "On", "Off", and "Tripped". Breakers indicated as multiple pole shall be common trip. Breakers shall be rated 600 volts with interrupting ratings not less than 42,000 amperes at 480 volts. Handle clips to prevent casual operation of breakers shall be provided for 10 percent (minimum of two) of the breakers and applied to the circuits directed. Breakers and provisions for future breakers shall be provided in the quantities, poles, and ampere ratings indicated.
- F. The panel shall have 3 phase buses, a neutral bus insulated from the cabinet, and a ground bus. Buses shall be copper, with ampere and voltage ratings and main lugs or breaker as indicated. The ground bus shall be similar to a neutral bus and shall have a good ground connection to the cabinet, a removable bond to the neutral bus, and clamp type lugs for the ground cable in each supply conduit, and connections for a ground cable in each load conduit.
- G. Panels shall have nameplates identifying the panel, and unit numbers where applicable. Nameplates shall be laminated black over white plastic, with 1/8-inch engraved letters, and shall be securely fastened to the enclosure.
- H. TVSS shall be provided at each panel and shall be suitable for use on all systems in this project. Maximum Suppressed Voltage Rating (SVR) per UL1449 2nd Edition shall not exceed 800 volts for L-N, N-G, & L-G and 1500 volts for L-L. The TVSS shall be designed to withstand a maximum continuous operating voltage (MCOV) of not less than 115% of nominal RMS voltage. The total surge current based on an 8 x 20 microsecond waveform that the device is capable of surviving shall not be less than 100kA per mode.
- I. TVSS minimum life shall be 2000 current surges of 5,000 amperes on a 10 x 20 microsecond waveshape, and the subsequent power follow current, per mode.
- J. TVSS shall be integral to the panel, listed for installation in the panel, and connected through a disconnecting means to the bus. Overcurrent protection shall be as recommended by the manufacturer.

- K. TVSS shall have visual and audible status indication plus form “C” relay contacts that change state when the TVSS has been damaged or is no longer providing protection. TVSS shall be UL1449 Second Edition listed.

2.11 ARC FLASH HAZARD ASSESSMENT

- A. The Contractor shall provide an arc flash hazard study of the electrical system in accordance with IEEE Std 1584 and NFPA 70E. The study shall be prepared under the direction of a professional engineer licensed in the state of North Carolina that is qualified to perform power system studies. The arc flash hazard study shall be performed using a commercially available computer software package specifically designed for such use. Acceptable software packages are SKM Power Tools, EasyPower, ETAP, or pre-approved equal.
- B. Deliverables shall include a written report, single line diagram, arc flash labels, and data copy of the system model.
- C. Contractor shall provide a written report that summarizes the results of the power system study. The written report shall contain, at a minimum, the following sections:
 - 1. Executive Summary – A synopsis of overall findings including the total number of the overcurrent protective devices with insufficient short circuit current interrupting ratings.
 - 2. Introduction – A brief paragraph explaining the necessity of performing an arc flash hazard study.
 - 3. Methodology – A brief paragraph explaining the basis for the analyses performed for this project.
 - 4. Assumptions – A list of all valid engineering assumptions made and why they were made during this project.
 - 5. Discussion – A detailed discussion of the results.
 - 6. Recommendations – Detailed recommendations to reduce incident energy levels and to improve future maintenance and operation of the facility.
 - 7. Time–Current curves
 - 8. Bibliography – Industry references used to complete the report.
- D. Study shall include a single line diagram of the electrical system model in AutoCAD drawing format with a title block, drawing border, and other required drafting formats provided by the Owner. The single line diagram shall include incident energy levels at each buss level, available short circuit current at each buss level, and of all major overcurrent protection device settings.
- E. The Contractor shall provide and install arc flash labels for all system equipment in accordance with NFPA 70E and ANSI Z535.4. Each label shall include, at a minimum, the following elements:
 - 1. Flash Hazard Category
 - 2. Minimum arc rating (cal/cm²)
 - 3. Flash Protection Boundary (inches)
 - 4. Required PPE
 - 5. Limited Approach Boundary (inches)

6. Restricted Approach Boundary (inches)
7. Prohibited Approach Boundary (inches)
8. Equipment Identification
9. Date of arc flash study.

- F. Contractor shall provide a data copy on CD of the electrical system model that is compatible with the software package used for the arc flash hazard study.

2.12 COORDINATION STUDY

- A. If required for installation and start-up of equipment, the Contractor shall provide a complete coordination study of relays, fuses, circuit breakers, and all other protective devices. The coordination study shall include the entire distribution system starting with the smallest 208-volt, 1 phase, 60 Hz circuit protective device on the load end, to the nearest protective device on the power company's line side.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 16000

SECTION 16200
SCADA SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section of the specifications includes the furnishing and installation of all labor, materials, tools, equipment, and operations necessary for the proper execution and completion of all electrical work indicated on the drawings and specified herein.
- B. The Contractor shall furnish and install all conduit, cable, systems for power, and shall furnish and install raceways for special systems as specified herein and as indicated on the electrical drawings, complete and ready to operate in every respect, including connection of Owner furnished equipment, if applicable.

PART 2 - MATERIALS

2.1 GENERAL PRODUCT DESCRIPTION

- A. SCADA System shall be a wireless, web-based alarm detection and notification system from Missions Communications designed specifically for water and wastewater applications.
- B. Unit shall be a MyDro 150 RTU System, programmed to receive and send the following conditions:
 - 1. Wetwell High Level
 - 2. Wetwell Low Level
 - 3. Pump #1 Running
 - 4. Pump #2 Running
 - 5. Pump #1 Failure (Seal Failure or Thermal Overload)
 - 6. Pump #2 Failure (Seal Failure or Thermal Overload)
 - 7. Power Failure
 - 8. Back-up Pump Running

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The SCADA shall be configured to communicate desired alarms in accordance with owner's requirements. The pump control panel shall also be configured with dry contacts to communicate alarm conditions to the SCADA System.

END OF SECTION 16200