

PROJECT MANUAL
FOR
TOWN OF RIDGELAND
WATER AND SEWER RESILIENCY
IMPROVEMENTS
RIDGELAND, SC

REQUEST FOR BIDS NO.: TOR-2023-02



**THE TOWN OF RIDGELAND,
SOUTH CAROLINA**

VOLUME I
EDA AWARD #: 04-79-07454

PREPARED BY:
FOUR WATERS ENGINEERING, INC.
FOR
THE TOWN OF RIDGELAND, SC
MAY 2023

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If archeological materials are encountered during construction, the procedures codified at 33 CFR 800.13(b) will apply and EDA, the South Carolina State Historic Preservation Office, the Muscogee (Creek) Nation and the Catawba Indian Nation shall be contacted immediately. Archeological Materials consist of any items, fifty years or older which were made or used by man. These items include, but are not limited to, stone projectile points (arrowheads), ceramic sherds, bricks, worked wood, bone and stone, metal and glass objects, and human skeletal remains.

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SECTION 00010

NOTICE TO BIDDERS

Notice is hereby given that sealed bids will be received for **Town of Ridgeland Water and Sewer Resiliency Improvements, Request for Bids No. TOR-2023-02**, by the Town of Ridgeland, South Carolina, until **Tuesday, June 20, 2023, at 2:00 PM**, at which time all bids received will be publicly opened and read aloud.

Mail Bid Response to:

Town of Ridgeland
ATTN: Dennis E. Averkin, Town Administrator
P.O. Box 1119
Ridgeland, SC 29936

Hand Deliver Bid Response to:

Town of Ridgeland
ATTN: Dennis E. Averkin, Town Administrator
1 Town Square
Ridgeland, SC 29936

Any bids delivered after the above time will not be accepted under any circumstances and submission of no bid is considered a bid. Any uncertainty regarding the time a bid is delivered will be resolved against the Bidder.

Bid opening will take place at the Town of Ridgeland municipal offices at the address given below:

**Town of Ridgeland
1 Town Square
Ridgeland, South Carolina 29936**

The Town's points of contact for this project is Dennis E. Averkin, Town Administrator, who can be reached at (843) 726-7500 or by email at daverkin@ridgelandsc.gov.

Construction Contract Documents, including Bidding and Contract Documents, General Requirements, Plans and Technical Specifications may be viewed electronically and downloaded in Adobe Acrobat PDF from the Town of Ridgeland website, <https://www.ridgelandsc.gov/bid-opportunities>

It is requested that interested parties contact Four Waters Engineering, Inc., Engineer of Record, to be added to the Plan Holders List. Contact Angela Bryan of Four Waters Engineering, Inc., 324 6th Avenue North, Jacksonville Beach, Florida 32250 by email: abryan@4weng.com or phone (904) 414-2400 Ext 51. A hard copy of the Construction Contract Documents (plans in 11"x17" format) may be requested through Angela Bryan with the payment of \$200.00.

The U.S. Department of Commerce Economic Development Administration is providing partial funding for this project (EDA Investment No. 04-79-07454).

Description of Work:

- A. Construction of water and sewer system resiliency improvements including upgrade of existing pump systems at Pump Stations #3, 4, 5, 6, 8, 9, and 12, Well Site #2 upgrades, rehabilitation within three sewer basins: WRF, PS3 and PS4 Sewer Basins, and improvements to the Supervisory Control and Data Acquisition (SCADA) System.. Specific recommended improvements are as follows:

Part I - Pump Station Improvements:

- Pump Station 3 (PS3) 11306 North Jacob Smart Boulevard: A complete replacement of the existing pump station with new wet well, valve vault, influent gravity sewer system, duplex 57.5 Hp pumps and associated equipment and piping, wet well wizard, discharge bypass connection, a generator, transfer switch, SCADA upgrades, WRF forcemain reroute, new 2" water service from US17, and site and access road improvements.
- Pump Station 4 (PS4) 123 James Taylor Drive: A complete replacement of the existing pump station with new wet well, valve vault, influent gravity sewer system, duplex 24.8 Hp pumps and associated equipment and piping, wet well wizard, discharge bypass connection, a generator, transfer switch, SCADA upgrades, electrical and site improvements.
- Pump Station 5 (PS5) 1514 Grays Highway: Rehabilitation of the pump station to include new duplex 2.4 Hp grinder pumps, guide rails and associated equipment and piping in wet well and valve vault, wet well wizard, bypass discharge connection system, a new control panel with junction boxes and conduit seals, a generator, transfer switch, electrical improvements, SCADA upgrades, fence expansion, and other facility improvements.
- Pump Station 6 (PS6) 135 Correctional Road: Rehabilitation of the pump station to include coating of the wet well, new duplex 20.1 Hp pumps and guide rails, piping and valves in wet well and valve vault, wet well wizard, flow meter, discharge bypass connection, a new control panel with junction boxes and conduit seals, SCADA upgrades, raised wet well and reconfiguration of electrical conduit through wet well wall, generator and other electrical improvements and site improvements.
- Pump Station 8 (PS8) 4399 Grays Highway: Rehabilitation of the pump station to include coating of the wet well, new pump discharge piping in the wet well; new piping and valves in valve vault and wet well vent, wet well wizard, new ductile iron discharge bypass connection, a new control panel with junction boxes and conduit seals, fence relocation for proper panel clearance, and new generator and transfer switch, electrical and SCADA upgrades.
- Pump Station 9 (PS9) 2070 Grays Highway: Rehabilitation of the pump station is to include coating of the wet well, new pump discharge piping in the wet well; new piping and valves in the valve vault, new aboveground ductile iron discharge bypass connection and wet well vent, wet well wizard, a new control panel with junction boxes and conduit seals, SCADA upgrades, site improvements to raise elevation, raise wet well and valve vault top slabs, raising of influent manhole top elevation, electrical improvements, site and access road improvements.
- Pump Station 12 (PS12) 12308 North Jacob Smart Boulevard: Rehabilitation of the pump station is to include coating of the wet well, new duplex 2.68 Hp pumps and guide rails, new discharge piping in the wet well; new piping and valves in the valve vault, new wet well vent, a new control panel with junction boxes and conduit seals, wet well wizard, a new abovegrade discharge bypass connection, new raised wet well and valve vault top

slabs, SCADA upgrades, new generator and electrical improvements, and site grading and improvements.

Part II - Gravity Sewer Rehabilitation:

Gravity sewer pipe rehabilitation by Cured-In-Place-Pipe (CIPP), Pipe Bursting, or Open Cut methods, rehabilitation of 57 existing manholes with a varying combination of cementitious mortar interior lining, urethane rubber sealing system for manhole chimney, HDPE manhole inserts, new manhole covers, new manhole frame, adjustment to or above grade, and/or external rubber seal on manhole chimney and frame. Construction also includes pre-construction sewer pipe cleaning, pre- and post-construction CCTV, all necessary sewer system bypassing operations, sewer lateral restoration, 4 new manholes, removal of 1 manhole, rerouting of an existing water main from a sewer conflict manhole, maintenance of traffic, soil erosion and sediment control, and restoration including pavement repair and overlay to SCDOT standards (all roads are SCDOT).

Sewer Basin Improvements:

- PS3 Sewer Basin (Area A in Drawings)
 - o ~1795 LF pipeburst 10-inch to 12-inch gravity sewer
 - o ~925 LF pipeburst 8-inch to 10-inch gravity sewer
 - o 13 manholes rehabilitation.
- WRF Sewer Basin (Area B in Drawings)
 - o ~350 LF – Remove 8-inch Orangeburg and replace with 8-inch PVC gravity sewer
 - o ~105 LF – Remove 8-inch VCP gravity sewer
 - o ~5400 LF CIPP 8-inch gravity sewer
 - o ~260 LF CIPP 10-inch gravity sewer
 - o ~185 LF install new 8-inch PVC gravity sewer
 - o ~70 LF install new 12-inch steel casing by open cut
 - o ~110 LF point repair of 8-inch gravity sewer
 - o 26 manholes rehabilitation
 - o 4 new precast manholes
 - o 1 manhole removal
 - o Reroute ~50 LF 8-inch water main from sewer conflict manhole.
- PS4 Sewer Basin (Area C in Drawings)
 - o ~20 LF CIPP 10-inch gravity sewer
 - o ~2650 LF Clean and Flush gravity sewer only
 - o 18 manholes rehabilitation.

Part III - Well Site 2 Improvements:

- o Building footprint expansion and new roof system
- o Building and piping paints and coatings
- o Building doors replacement
- o New chlorination chemical feed system
- o New phosphate chemical feed system
- o Electrical service upgrade
- o New Emergency generator and automatic transfer switch
- o New control panel components – starters and controls
- o Other electrical improvements
- o SCADA upgrades

Part IV Supervisory Control and Data Acquisition (SCADA System) Upgrades:

The proposed SCADA system improvements for the Town's water and sewer facilities will need to be compatible and unified with the Jimmy Mixson WRF SCADA system. SCADA upgrades will be provided at the Town's water and sewer facilities including 16 pump stations, three well sites, and five elevated storage tanks.

Pre-bid Conference:

There will be an optional pre-bid conference for this project on Tuesday, May 30, 2023 at 10:30 AM starting at the Town of Ridgeland offices at 1 Town Hall, Ridgeland, SC 29936.

Bid Document Questions:

Questions or concerns related to the bid documents must be written and sent by email to Dennis E. Averkin, Town Administrator, at daverkin@ridgelandsc.gov. The last day to submit questions is **June, 15, 2023**.

Bid Requirements:

Each bid must be accompanied by Bid security made payable to Town of Ridgeland (Owner) in an amount of five percent (5%) of Bidder's maximum Bid price and in the form of a certified or bank check or a Bid Bond issued by a surety authorized to write bonds of such character and amount under the laws of South Carolina and meeting the requirements of the General Conditions.

The successful Bidder will be required to furnish to the Owner a Payment Bond and a Performance Bond, each in the amount of one hundred percent (100-percent) of the Contract Price.

Each Bidder must be qualified under the provisions of the most current State of South Carolina Contractor's Licensing Law Code. No bid will be considered unless the bidder is legally qualified under the provisions of the South Carolina Contractor's Licensing Law.

All Bids will remain subject to acceptance for ninety (90) days after the day of the Bid opening. The Town of Ridgeland (Owner) reserves the right to reject any or all bids, including without limitation the right to reject any or all nonconforming, non-responsive, unbalanced or conditional Bids. Owner also reserves the right to waive all informalities not involving price, time or changes in the Work and to negotiate contract terms with the Successful Bidder. The terms of Award of Contract are included in Article 17 of the Instructions to Bidders.

Bidders on this work will be required to comply with the President's Executive Order No. 11246 and Order No. 11375 which prohibit discrimination in employment regarding race, creed, color, sex or national origin.

Bidders must comply with Title VI of the Civil Rights Act of 1964, the Davis-Bacon Act, the Anti-Kickback Act, the Contract Work Hours and Safety Standards Act, and 40 CFR 33.240.

This project will be constructed with funds either in whole or in part provided by the U.S. Department of Commerce Economic Development Administration (EDA). All federal EDA requirements will apply to the contract. All contractors and subcontractors are required to be registered in the federal System for Award Management (SAM).

Bidder must make positive efforts to use small and minority owned businesses and to offer employment, training and contracting opportunities in accordance with Section 3 of the Housing and Urban Development Act of 1968.

Attention of bidders is particularly called to the requirements as the conditions of employment to be observed and minimum wage rates to be paid under the contract.

Any prospective bidder, offeror, contractor or subcontractor who is aggrieved in connection with the solicitation of this contract may protest to Owner in accordance with Section 11-35-4210 of the SC Code of Laws, within 15 days of the date of issuance of the Notice of Intent to Award.

Equal Employment Opportunity.

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INSTRUCTIONS TO BIDDERS

1. Defined Terms

Terms used in these Instructions to Bidders which are defined in the Engineers Joint Contract Documents Committee (EJCDC) Standard General Conditions of the Construction Contract (No. C-700) (2007 Edition) have the meaning assigned to them in the General Conditions.

Certain additional terms used in these Instructions to Bidders have the meanings indicated below which are applicable to both the singular and plural thereof.

1.1. Bidder—one who submits a Bid directly to Owner as distinct from a sub-bidder, who submits a bid to a Bidder.

1.2. Issuing Office—the office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered.

1.3. Successful Bidder—the responsible and responsive Bidder to whom Owner (on the basis of Owner’s evaluation as hereinafter provided) makes an award.

1.4. OWNER
TOWN OF RIDGELAND
1 TOWN SQUARE
P.O. BOX 1119
RIDGELAND, SC 29936
(843) 726-7500

1.5 ENGINEER
FOUR WATERS ENGINEERING, INC.
324 6TH AVENUE N
JACKSONVILLE BEACH, FL 32250
(904) 414 - 2400

2. Copies of Bidding Documents

2.1 Complete sets of the Bidding Documents in the number and for the deposit sum, if any, stated in the Advertisement or Notice to Bidders may be

obtained from the Issuing Office. The deposit will not be refunded.

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

2.3 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. Qualifications of Bidders.

3.1 To demonstrate qualifications to perform the work, each Bidder must be prepared to submit within five days after the Bid opening upon Owner’s request detailed written evidence such as financial data, previous experience, present commitments and other such data as may be called for below (or in the Supplementary Conditions). Each Bid must contain evidence of Bidder’s qualification to do business in the state where the Project is located or covenant to obtain such qualification prior to award of the contract.

4. Examination of Contract Documents and Site.

4.1 It is the responsibility of each Bidder Before submitting a Bid:

4.1.1 To examine thoroughly the Contract Documents and other related data identified in the Bidding Documents (including “technical data” referred to below);

4.1.2 To visit the site to become familiar with and satisfy Bidder as to the general, local and site conditions that may affect cost, progress, performance or furnishing of the Work;

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4.1.3. To consider federal, state and local Laws and Regulations that may affect cost, progress, performance or furnishing of the Work;

4.1.4 To study and carefully correlate Bidder's knowledge and observations with the Contract Documents and such other related data; and

4.1.5 To promptly notify Engineer of all conflicts, errors, ambiguities or discrepancies which Bidder has discovered in or between the Contract Documents and such other related Documents

4.2 Before submitting a Bid each Bidder will be responsible to obtain such additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the site or otherwise, which may affect cost, progress, performance or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences or procedures of construction to be employed by Bidder and safety precautions and programs incident thereto or which Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price and other terms and conditions of the Contract Documents.

4.3 On request, Owner will provide each Bidder access to the project site(s) to conduct such examinations, investigations, explorations, tests and studies as each Bidder deems necessary for submission of a Bid. Bidder must fill all holes and clean up and restore the site to its former conditions upon completion of such explorations, investigations, tests and studies.

4.4 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with

every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Contract Documents and applying the specific means, methods, techniques, sequences or procedures of construction (if any) that may be shown or indicated or expressly required by the Contract Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities and discrepancies that Bidder has discovered in the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

4.5 The provisions of I-4.1 through 4.4, inclusive, do not apply to Asbestos, Polychlorinated biphenyls (PCBs), Petroleum, Hazardous Waste or Radioactive Material covered by Paragraph 4.06 of the General Conditions.

5. Availability of Lands for Work, etc.

The lands upon which the Work is to be performed, rights-of-way and easements for access thereto and other lands designated for use by Contractor in performing the Work are identified in the Contract Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by Contractor. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by Owner unless otherwise provided in the Contract Documents.

6. Interpretations and Addenda.

6.1. All questions about the meaning or intent of the Bidding Documents are to be directed to Owner. Interpretations or clarifications considered necessary by

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Owner in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by Engineer as having received Bidding Documents. Questions received less than ten days prior to the date for opening of Bids may not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

6.2. Addenda may also be issued to modify the Bidding Documents as deemed advisable by Owner or Engineer.

7. Bid Security.

7.1. Each Bid must be accompanied by Bid security made payable to Owner in an amount of five percent of Bidder's maximum Bid price and in the form of a certified or bank check or a Bid Bond (on form attached) issued by a surety meeting the requirements of Paragraph 5.01 of the General Conditions.

7.2 The Bid security of Successful Bidder will be retained until such Bidder has executed the Agreement, furnished the required contract security and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful Bidder fails to execute and deliver the Agreement and furnish the required contract security within fifteen days after the Notice of Award, Owner may annul the Notice of Award and the Bid security of that Bidder will be forfeited. The Bid security of other Bidders whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of the seventh day after the Effective Date of the Agreement or the thirty-sixth day after the Bid opening, whereupon Bid security furnished by such Bidders will be returned. Bid security with Bids which are not competitive will be

returned within seven days after the Bid opening.

8. Contract Times.

The number of days within which, or the dates by which, the Work is to be substantially completed and also completed and ready for final payment (the term "Contract Times" is defined in paragraph 1.01, A.14 of the General Conditions) are set forth in the Agreement.

9. Liquidated Damages.

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

10. Substitute and "Approved Equals" Items.

The Contract, if awarded, will be on the basis of materials and equipment described in the Drawings or specified in the Specifications with the consideration of substitute or "approved equals," as approved by the engineer of record.

11. Not Used.

12. Bid Form.

12.1. The Bid Form is included with the Bidding Documents; additional copies may be obtained from Engineer (or the Issuing Office).

12.2. All blanks on the Bid Form must be completed by printing in black ink or by typewriter.

12.3 Bids by corporations must be executed in the corporate name by the president or a vice-president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal must be affixed and attested by the secretary or an assistant secretary. The corporate

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address and state of incorporation must be shown below the signature.

12.4. Bids by partnerships must be executed in the partnership name and signed by a partner, whose title must appear under the signature and the official address of the partnership must be shown below the signature.

12.5. All names must be typed or printed in black ink below the signature.

12.6. The Bid shall contain an acknowledgement of receipt of all Addenda (the numbers of which must be filled in on the Bid Form).

12.7. The address and telephone number for communications regarding the Bid must be shown.

12.8. Evidence of authority to conduct business as an out-of-state corporation in the state where the Work is to be performed shall be provided in accordance with Paragraph 3 above. State contractor license number, if any, must also be shown.

13. Submission of Bids.

13.1 Bids shall be submitted at the time and place indicated in the Notice to Bidders and shall be enclosed in an opaque sealed envelope, marked with the Project title and name and address of Bidder and accompanied by the Bid security and other required documents. Bidder's Contractor License Number must appear on the front of the envelope containing his Bid. If the Bid is sent through the mail or other delivery system the sealed envelope shall be enclosed in a separate envelope with the notation "BID ENCLOSED" on the face of it.

13.2 Reference Section 00300 Bid Proposal Form for items and information to

be completed by Bidder and included with the Bid:

14. Modification and Withdrawal of Bids.

14.1 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.

If, within ninety (90) days after Bids are opened, any Bidder files a duly signed, written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid and the Bid security will be returned. Thereafter, that Bidder will be disqualified from further bidding on the Work to be provided under the Contract Documents.

15. Opening of Bids.

Bids will be opened and (unless obviously non-responsive) read aloud publicly at the place where Bids are to be submitted. An abstract of the amounts of the base Bids and major alternates (if any) will be made available to Bidders after the opening of Bids.

16. Bids to Remain Subject to Acceptance.

All Bids will remain subject to acceptance for 90 days after the day of the Bid opening, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to that date.

17. Award of Contract.

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17.1 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 the Project to make an award to that Bidder, whether because the Bid is not responsive or the Bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by Owner. Owner also reserves the right to waive all informalities not involving price, time or changes in the Work and to negotiate contract terms with the Successful Bidder. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between words and figures will be resolved in favor of the words.

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

17.3 Owner may conduct such investigations as Owner deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications and financial ability of Bidders, proposed Subcontractors, Suppliers and other persons and organizations to perform and furnish the Work in accordance with the Contract Documents to Owner's satisfaction within the prescribed time.

17.4 If the contract is to be awarded, it will be awarded to Bidder whose evaluation of price and schedule by Owner indicates to

Owner that the award will be in the best interests of the Project.

17.5 If the contract is to be awarded, Owner will give Successful Bidder a Notice of Intent to Award within thirty-five days after the day of the Bid opening.

18. Contract Security.

Paragraph 5.01 of the General Conditions and the relevant specification sections and Section 00506 U.S. Department of Commerce Economic Development Administration Contracting Provisions for Construction Projects set forth Owner's requirements as to performance and payment Bonds. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by the required performance and payment Bonds.

19. Signing of Agreement.

When Owner gives a Notice of Award to the Successful Bidder, it will be accompanied by the required number of unsigned counterparts of the Agreement with all other written Contract Documents attached. Within fifteen days thereafter Contractor shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner with the required Bonds. Within ten days thereafter Owner shall deliver one fully signed counterpart to Contractor. Each counterpart is to be accompanied by a complete set of the Drawings with appropriate identification.

20. Prebid Conference.

There will be an optional pre-bid conference for this project on Tuesday, May 30, 2023 at 10:30 am at the Town of Ridgeland Offices. All questions regarding this project and associated bid documents should be directed to the Engineer during the pre-bid

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conference and in writing to the Owner during the question period.

21. Not Used.

22. Retainage.

Provisions concerning retainage and Contractors' rights to deposit securities in lieu of retainage are set forth in the Agreement.

**SECTION 00300
BID PROPOSAL FORM**

NAME OF BIDDER: _____

BUSINESS ADDRESS: _____

BUSINESS TELEPHONE: _____

PROJECT IDENTIFICATION:

**Town of Ridgeland Water and Sewer Resiliency Improvements
RFB No: TOR-2023-02**

THIS BID IS SUBMITTED TO:

**Town Administrator
Town of Ridgeland
1 Town Square
Ridgeland, SC 29936**

1. The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an agreement with OWNER in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the Bid Price and within the Bid Times 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 Advertisement or Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for ninety days after the day of Bid opening. BIDDER will sign and deliver the required number of counterparts of the Agreement with the Bonds and other documents required by the Bidding Requirements within fifteen days after the date of OWNER's Notice of Award.

3. In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement that:

(a) BIDDER has examined and carefully studied the Bidding Documents and the following Addenda, receipt of all which is hereby acknowledged: (List Addenda by Addendum Number and Date)

Addendum No. _____ Date: _____
Addendum No. _____ Date: _____
Addendum No. _____ Date: _____
Addendum No. _____ Date: _____
Addendum No. _____ Date: _____
Addendum No. _____ Date: _____

- (b) BIDDER has visited the site and become familiar with and is satisfied as to the general, local and site conditions that may affect cost, progress, performance and furnishing of the Work;
- (c) BIDDER is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress, performance and furnishing of the Works.
- (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 above ground or Underground Facilities at or contiguous to the site. BIDDER has obtained and carefully studied (or assumes responsibility for having done so) all such additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the site or otherwise which may affect cost, progress, performance or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences and procedures of construction to be employed by BIDDER and safety precautions and programs incidental thereto. BIDDER does not consider that any additional examinations, investigations, explorations, tests, studies or data are necessary for the determination of this Bid for performance and furnishing of the Work in accordance with the times, price, and other terms and conditions of the Contract Documents.
- (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 the 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 refrain from bidding; and BIDDER has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER.

4. BIDDER will complete the Work in accordance with the Contract Documents for the following prices:

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**Schedule of Bid Prices for
Town of Ridgeland Water and Sewer Resiliency Improvements
(Base Bid)**

PART I – PUMP STATION IMPROVEMENTS

Item No.	M&P No.	Item	Quantities	Unit	Unit Price	Total Price
Pump Station 3 (PS-3) Improvements						
1	1	Pump Station 3 Improvements	1	LS	\$	\$
2	2	Pump Station 3 Access Road Improvements	1	LS	\$	\$
TOTAL BASE BID - PUMP STATION 3 IMPROVEMENTS					\$	
Pump Station 4 (PS-4) Improvements						
1	1	Pump Station 4 Improvements	1	LS	\$	\$
TOTAL BASE BID - PUMP STATION 4 IMPROVEMENTS					\$	
Pump Station 5 (PS-5) Improvements						
1	1	Pump Station 5 Improvements	1	LS	\$	\$
TOTAL BASE BID - PUMP STATION 5 IMPROVEMENTS					\$	
Pump Station 6 (PS-6) Improvements						
1	1	Pump Station 6 Improvements	1	LS	\$	\$
TOTAL BASE BID - PUMP STATION 6 IMPROVEMENTS					\$	
Pump Station 8 (PS-8) Improvements						
1	1	Pump Station 8 Improvements	1	LS	\$	\$
TOTAL BASE BID - PUMP STATION 8 IMPROVEMENTS					\$	
Pump Station 9 (PS-9) Improvements						
1	1	Pump Station 9 Improvements	1	LS	\$	\$
2	3	Pump Station 9 Access Road Improvements	1	LS	\$	\$
TOTAL BASE BID - PUMP STATION 9 IMPROVEMENTS					\$	
Pump Station 12 (PS-12) Improvements						
1	1	Pump Station 12 Improvements	1	LS	\$	\$
TOTAL BASE BID - PUMP STATION 12 IMPROVEMENTS					\$	

The Total Part I – Pump Station Improvements Cost (Base Bid) inclusive:

_____ dollars and cents (in words).

Part I – Pump Station Improvements – Alternates

Item No.	M&P No.	Item	Quantities	Unit	Unit Price	Total Price
Pump Station 3 (PS-3) Improvements - Alternate No. 1						
1	4	Pump Station 3 Improvements - Wetwell Installed by Caisson Method	1	LS	\$	\$
2	2	Pump Station 3 Access Road Improvements	1	LS	\$	\$
TOTAL ALTERNATE NO. 1 BID - PUMP STATION 3 IMPROVEMENTS					\$	

Pump Station 4 (PS-4) Improvements - Alternate No. 2						
1	4	Pump Station 4 Improvements - Wetwell Installed by Caisson Method	1	LS	\$	\$
TOTAL ALTERNATE NO. 2 BID - PUMP STATION 4 IMPROVEMENTS					\$	

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PART II – GRAVITY SEWER REHABILITATION

Item No.	M&P No.	Item	Quantities	Unit	Unit Price	Total Price
1	5	Remove and Replace Asphalt Roadway (Per SCDOT Approved Detail)	135	SY	\$	\$
2	6	Mill Existing Asphalt Roadway and Install 1-1/2 Inch Thick Asphalt Overlay with SCDOT Type C Asphalt; Restripe (Paint) Roadway per SCDOT Standards	250	SY	\$	\$
3	6	Mill Existing Asphalt Roadway and Install 1-1/2 Inch Thick Asphalt Overlay with SCDOT Type C Asphalt; Restripe (Thermoplastic) Roadway per SCDOT Standards	310	SY	\$	\$
4	7	Sewer Line Cleaning for Construction Prep (Jetting and Disposal)	11,680	LF	\$	\$
5	8	Sewer Line Root (Tap) Removal	45	EA	\$	\$
6	9	Intruding Sewer Lateral Cuts	4	EA	\$	\$
7	10	Pre-Construction and Post-Construction CCTV Inspection	18,475	LF	\$	\$
8	11	8" Gravity Sewer Rehabilitation - CIPP (includes sewer bypassing and sewer lateral reinstatement)	5,765	LF	\$	\$
9	11	10" Gravity Sewer Rehabilitation - CIPP (includes sewer bypassing and sewer lateral reinstatement)	20	LF	\$	\$
10	12	8" Gravity Sewer Rehabilitation - Pipe Bursting to 10" (includes sewer bypassing)	925	LF	\$	\$
11	12	10" Gravity Sewer Rehabilitation - Pipe Bursting to 12" (includes sewer bypassing)	1,800	LF	\$	\$
12	13	Sewer Service Lateral Reconnection (for Pipe Bursting or Pipe Replacement)	8	EA	\$	\$
13	14	Remove and Replace 8" Orangeburg Sewer Pipe with 8" PVC (SDR 26) Gravity Sewer Pipe (4'-10' Depth) (includes sewer bypassing)	350	LF	\$	\$
14	15	8" Gravity Sewer Point Repair (< 10' Depth) (includes sewer bypassing)	110	LF	\$	\$
15	15	10" Gravity Sewer Point Repair (< 10' Depth) (includes sewer bypassing)	20	LF	\$	\$
16	16	New 8" PVC (SDR26) Gravity Sewer Pipe (0' - 10' Depth)	185	LF	\$	\$
17	17	Remove Existing 8" Gravity Sewer Pipe (0' - 6' Depth) and Restore	105	LF	\$	\$
18	18	New 12" Steel Casing Pipe and Accessories (0'-6' Depth)	70	LF	\$	\$
19	19	Remove Existing Manhole and Restore (0'-6' Depth)	1	LS	\$	\$
20	20	New 4' Diameter Precast Concrete Manhole (0' - 10')	4	EA	\$	\$
21	21	Replace Manhole Cover	44	EA	\$	\$
22	22	Install HDPE Manhole Insert	61	EA	\$	\$

Item No.	M&P No.	Item	Quantities	Unit	Unit Price	Total Price
23	23	Install Urethane Rubber Seal on Interior Manhole Chimney/Frame	61	EA	\$	\$
24	24	Install External Rubber Seal on Manhole Chimney/Frame Above Grade	12	EA	\$	\$
25	25	Install Cementitious Mortar Lining in Manhole (4' Dia) (includes sewer bypassing)	500	VF	\$	\$
26	26	Replace Manhole Frame and Adjust to Above Grade	9	EA	\$	\$
27	27	Replace Manhole Frame and Adjust to Grade (including necessary asphalt/brick/concrete restoration)	34	EA	\$	\$
28	28	6" PVC Inside Drop for Forcemain	1	LS	\$	\$
29	29	12" PVC (DR18) Water Main	60	LF	\$	\$
30	30	Abandon 12" Water Main by Grout Fill	20	LF	\$	\$
31	31	12" MJ DI 45 Deg Bend	4	EA	\$	\$
32	31	12" MJ DI Sleeve	2	EA	\$	\$
33	32	A-3 FILL	10	CY	\$	\$
34	33	STONE BEDDING	10	CY	\$	\$
TOTAL BASE BID - GRAVITY SEWER IMPROVEMENTS					\$	

The Total Part II – Gravity Sewer Rehabilitation Cost (Base Bid) 1 through 34 inclusive:

_____ dollars and cents (in words).

PART III – WELL SITE #2 IMPROVEMENTS

Item No.	M&P No.	Item	Quantities	Unit	Unit Price	Total Price
Well Site #2 Improvements						
1	34	Well Site #2 Building Improvements	1	LS	\$	\$
2	35	Well Site #2 Electrical, Generator, ATS, and Fuel Tank Improvements	1	LS	\$	\$
3	36	All Other Required Well Site #2 Improvements	1	LS	\$	\$
TOTAL BASE BID - WELL SITE #2 IMPROVEMENTS					\$	

The Total Part III – Well Site #2 Improvements Cost (Base Bid) 1 through 3 inclusive:

_____ dollars and cents (in words).

PART IV – SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA) UPGRADES

Item No.	M&P No.	Item	Quantities	Unit	Unit Price	Total Price
Supervisory Control and Data Acquisition (SCADA) Improvements						
1	37	SCADA Improvements - All Sites	1	LS	\$	\$
TOTAL BASE BID - SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA) IMPROVEMENTS						\$

The Total Part IV – Supervisory Control and Data Acquisition (SCADA) Improvements

Cost (Base Bid) 1 through 1 inclusive:

_____ dollars and cents (in words).

Note: All scheduled Bid Items may not be awarded. In such case, the OWNER shall select the most advantaged combination that meets project requirements, specification details, and budget availability.

Unit Prices have been computed in accordance with paragraph 11.03 of the General Condition.

Bidder acknowledges that quantities are not guaranteed and final payment will be based on actual quantities determined as provided in the Contract Documents.

5. BIDDER agrees that the Work will be substantially complete within 365 calendar days after the date when the Contract Time commences to run as provided in paragraph 2.03 of the General Conditions, and completed and ready for final payment in accordance with paragraph 14.07 of the General Conditions within 395 calendar days after the date when the Contract Time commences to run.

BIDDER accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within the times specified in the Agreement.

6. The following documents are attached to and made a condition of this Bid:

(a) Required Bid Security in the form of _____

7. Communications concerning this Bid shall be addressed to the address of BIDDER indicated on Page 00300-1.

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Notes on Bid Form:

1. Bidder shall submit a detailed Work Plan and schedule with the Bid. The Work Plan must include all anticipated project milestones, including dates of commencement, substantial completion, and final completion. Dates may be referenced (by days) from the Notice to Proceed. Final critical dates shall be determined during Contract negotiations between the selected CONTRACTOR and OWNER.

2. Bid form is given for general guidance only. Bidders shall inspect the project site and be familiar with local conditions and develop a detailed breakdown of quantities and costs.

3. All supporting documentation and drawings shall be included as attachments to the Bid Forms, including:

- Qualifications and experience documentation including:
 - Experience List
 - Reference List
 - Equipment List
 - Subcontractor List
 - Business License
 - Contractor's License
- Work Plan including proposed methods and schedule (can be submitted after project is awarded)
- Acknowledgment of Receipt of Addenda.

4. The following sections shall be included with the Bid and all associated forms and certifications therein shall be completed:

00010	Notice to Bidders
00100	Instructions to Bidders
00300	Bid Proposal Form
00400	Bid Bond with Payment
00500	Contract
00502	Wage Determination – General Decision Number: SC20230001 01/06/2023
00504	Federal Labor Standards Provisions
00506	US Department of Commerce Economic Development Administration Contracting Provisions for Construction Projects
00508	Debarment Certification
00509	W-9 Request for Taxpayer Identification Number and Certification
00520	South Carolina Illegal Immigration Reform Act Contractor Certification
CD-512	Certification Regarding Lobbying Lower Tier Covered Transactions

Notice of Requirements for Affirmative Action to Ensure Equal Employment Opportunity (Executive Order 11246 and 41 CFR Part 60-4)

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If BIDDER is:

An Individual

By _____
(Individual's Name)

Signature _____

doing business as _____

Business address: _____

Phone No.: _____

A Partnership

By _____
(Firm Name)

(general partner signature)

Business address: _____

PhoneNo.: _____

A Corporation

By _____
(Corporation Name)

(state of incorporation)

By _____
(signature of authorized person)

(Title)

(Corporate Seal)

Attest _____
(Secretary)

Business address: _____

Phone No.: _____

(V) Date of Qualification to do business is _____

IN WITNESS WHEREOF, the Principal and Surety have hereunto caused this Bond to be duly executed and acknowledged by their appropriate officials as set forth below this _____ day of _____, 2023.

PRINCIPAL (If Sole Proprietor or Partnership)

(Firm Name)

ATTEST

By: _____
(SEAL)

Title (Sole Proprietor or Partner)

PRINCIPAL (If Corporation)

(Corporate Name)

By: _____
(President)

Attest: _____
(Secretary)

(Impress Corporate Seal)

COUNTERSIGNED BY
RESIDENT SOUTH CAROLINA
AGENT OF SURETY:

SURETY:

(Copy of Agent's current license
as issued by State of South Carolina
Insurance Commissioner

By: _____
Attorney-In-Fact
(Power of Attorney Must Be Attached)

(Impress Corporate Seal)

END OF SECTION 00400

**SECTION 00500
CONTRACT**

THIS CONTRACT made and entered into this _____ day of _____, 2023, by and between the Town of Ridgeland, South Carolina, hereinafter referred to as the “Owner”, a body politic and corporate and political subdivision of the State of South Carolina, whose administrative address is: 1 Town Square, Ridgeland, South Carolina 29936; and, _____ hereinafter referred to as the “Contractor”, a corporation formed and existing under the laws of the State of _____ and authorized to do business within the State of South Carolina, whose administrative address is: _____

WITNESSETH:

WHEREAS, the Owner has a project entitled **Town of Ridgeland Water and Sewer Resiliency Improvements, Ridgeland, SC** hereinafter referred to as the “Project”, and;

WHEREAS, the Contractor has submitted the lowest responsible and responsive bid for the Project at \$ _____ and the Owner has awarded the Project to the Contractor; and

NOW, THEREFORE, in consideration of the mutual promises and covenants contained herein, as well as other good and valuable consideration not specifically mentioned, the parties agree as follows:

1. The Contractor, for and in consideration of the payments hereinafter specified and agreed to be made by the Owner, hereby covenants and agrees to furnish and deliver all materials required, to do and perform all the work and labor, in a satisfactory and workmanlike manner, required to complete the Project within the time specified, in strict and entire conformity with the Construction Contract Documents, on file at the Town of Ridgeland offices, Ridgeland, SC, which are duly approved by the Owner and which said Project Manual, Drawings, Technical Specifications and other Contract Documents are hereby made part of this Contract as fully and with the same effects as if the same had been set forth at length in the body of this Contract.
2. The Contractor hereby agrees to indemnify, defend and hold the Owner and its agents, representatives and employees harmless from any and all liabilities, losses, damages, penalties, judgments, awards, claims, demands, costs, expenses, including reasonable attorney’s fees and court costs, actions, lawsuits or other proceedings arising directly or indirectly, in whole or in part, out of the negligence or willful acts or omissions of the Contractor, its prime contractor, trade subcontractors and consultants or their respective agents, directors, officers or employees in connection with this Contract or in any way with the services or Work described herein, any occurrence at the Project site, or any occurrence arising in connection with or at the Project site or in connection with the Work, whether within or beyond the scope of its duties hereunder.
3. The Contractor’s indemnity and defense obligations under this Contract shall be absolute notwithstanding any provision contained herein or elsewhere to the contrary, and shall survive Final Completion and Final Payment for a period equal to the statute of limitations for any action which could

be brought against the Owner or its agents, officers, directors and employees and shall continue through the duration of any action brought during the applicable time periods.

4. The Contractor agrees to indemnify, defend and hold the Owner and its agents, representatives, officers, directors and employees harmless from all costs, damages and expenses, including reasonable attorneys fees, incurred by the Owner and its consultants by virtue of any claim or claims filed by any trade prime or subcontractor, mechanic, laborer, or material-man making claims arising from the performance of the Work by, through, or under the Contractor, provided the Contractor has received from the Owner all amounts properly due under this Contract concerning the claim. The Contractor shall execute and deliver to the Owner's title insurer similar indemnifications or such other document as such title insurer shall reasonably request in order to protect it against lien claims from trade prime or subcontractors. The Contractor also hereby agrees to indemnify and hold harmless, protect and defend the Owner and its consultants from and against any liability, claim, judgment, loss or damage, including, but not limited, to direct damages, attorney's fees, court costs and expenses of collection, occasioned in whole or in part by the sole failure of the Contractor, and its trade prime or subcontractors to comply with any of the terms or provisions of this Contract.

5. In any and all claims against the Owner by any employee of the Contractor or trade prime or subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this Paragraph 2 shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any trade prime or subcontractor under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts.

6. The Owner hereby agrees to pay to the Contractor for the said work, when fully completed, the total sum of \$ _____ (the said sum being the total of the Contractor's bid, a copy of which is attached hereto and made a part hereof for all purposes), subject to such additions and deductions as may be provided for in the Construction Contract Documents. In the event the Bid contains multiple pay items, it is understood that the amount to be paid shall be the total based on the unit prices, together with lump sum prices, contained in said bid, for the work actually completed. Payments on accounts will be made as provided for in the Construction Contract Documents, Project Manual, Division 1, General Requirements, Section 01290, Payment Procedures. The Contractor shall submit bills for fees or other compensation for services or expenses in detail sufficient for a proper pre-audit and post audit thereof. Any unit of provision of goods and services must be approved in writing by the Owner prior to payment.

7. The Owner may unilaterally cancel this Contract and the goods and services thereunder in the event that the Contractor fails and refuses to allow public access to all documents, papers, letters, or other material subject to the provisions of the applicable South Carolina Statutes, made or received by the Contractor in conjunction with this Contract.

8. The Construction Contract Documents provide the criteria and the final date for completion of the Work of the Project.

9. This Contract has been executed by the parties prior to the rendering of any goods or services by the Contractor.

10. The Contractor shall provide a payment and material bond and performance bond (the Bonds) to the Owner meeting the requirements of Applicable South Carolina Statute in the sum of \$ _____ each and shall cause the Bonds to be recorded with the Notice of Award in the Public Records of the Town of Ridgeland, South Carolina

11. This Contract shall be subordinate to any rule, regulation, order or law of the United States of America, or the State of South Carolina.

12. Contractor and its employees shall promptly observe and comply with then applicable provisions of all Federal, State and local laws, rules and regulations which govern or apply to the goods and services rendered by the Design/Builder hereunder, or to the wages paid by the Contractor to its employees. Contractor shall require all of its prime and subcontractors and consultants to comply with the provisions of this paragraph.

13. Contractor shall procure and keep in force during the term of this contract all necessary licenses, registrations, certificates, permits and other authorizations as are required by law in order for Contractor to render its services hereunder. Contractor shall require all of its prime and subcontractors and consultants to comply with the provisions of this paragraph.

14. All remedies provided in this Contract shall be deemed cumulative and additional and not in lieu of or exclusive of each other or of any other remedy available to any party at law or in equity. In the event one party shall prevail in any action (including appellate proceedings), at law or in equity arising hereunder, the losing party will pay all costs, expense, reasonable attorneys' fees and all other actual and reasonable expenses incurred in the defense and/or prosecution of any legal or arbitration proceedings, including, but not limited to, those for paralegal, investigate and legal support services and actual fees charged by expert witnesses for testimony and analysis, incurred by the prevailing party referable thereto.

15. Contractor represents and warrants unto Owner that no officer, employee or agent of Owner has any interest, either directly or indirectly, in the business of the Contractor to be conducted hereunder. Contractor further represents and warrants to Owner that it has not employed or retained any company person, other than a bona fide employee working solely for Contractor, to solicit or secure this Contract, that it has not paid or agreed to any person, company, corporation, individual or firm, other than a bona fide employee working solely for Contractor, any fee, commission, percentage, gift, or any other consideration contingent upon or resulting from the award or making of this Contract, and that it has not agreed, as an express or implied condition for obtaining this Contract, to employ or retain the services of any firm or person in connection with carrying out this Contract. Contractor assures that it will insert the above provision in each of its prime and subcontractor and consultants' agreements relating to the services to be performed hereunder.

16. The headings of the sections of this Contract are for the purpose of convenience only and shall not be deemed to expand or limit the provisions contained in such sections.

17. This Contract, including all Contract documents, constitute the entire understanding and agreement between the parties and shall supersede and replace all prior agreements or understandings, written or oral, relating to the matters set forth herein.

18. This Contract shall not be amended or modified other than in writing signed by the parties hereto. Notwithstanding the foregoing, any Amendments that are not being paid for, in whole or in part, with funds granted by the United States of America or State of South Carolina need not be approved by them.

19. The validity, interpretation, construction and effect of this Contract shall be in accordance with and be governed by the laws of the State of South Carolina. In the event any provision hereof shall be finally determined to be unenforceable, or invalid, such unenforceability or invalidity shall not affect the remaining provisions of this Contract which shall remain in full force and effect.

20. All Construction Contracts Over \$2,000: Contract Work Hours and Safety Standard Act Requirements. The contracts must include a provision for compliance with Sections 103 and 107 of the Contract Work Hours and Safety Standards Act (40 USC 327-330) as supplemented by the Department of Labor regulations (29 CFR Part 5). Under Section 103 of the Act, each Contractor shall be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard workweek is permissible provided that the worker is compensated at a rate not less than one times the basic rate of pay for all hours worked in excess of 40 hours in the workweek. Section 107 of the Act is applicable to construction work and provides that no laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to health and safety as determined under construction, safety and health standards promulgated by the Secretary of Labor. These requirements do not apply to the purchases of supplies, materials, or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

21. Payment

A. Initial (First) Monthly Application for Payment

1. Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include, but are not limited to the following:
 - a. List of all prime contractors, first and second tier subcontractors.
 - b. Contractor's Sworn Statement of principal suppliers, fabricators, prime and subcontractors.
 - c. Schedule of Values.
 - d. Contractor's construction schedule, to be updated monthly.
 - e. Initial progress report.
 - f. Certificates of Insurance and insurance policies.
 - g. Any materials stored on-site must carry insurance (All Risk Rider) stating Owner as insured. All materials will be inspected by the Owner before billing can be approved. Bill of Sale and receipts for items being billed at cost only are required and 10% retainage will be held for on-site stored materials. Paperwork must accompany request two weeks prior to billing to insure adequate time to schedule Owner's inspection.
 - h. Any material stored off site must carry additional insurance (All Risk Rider) stating Owner as insured. All material will be inspected by the Owner before billing can be approved. Bill of Sale and receipts for items being billed at cost only are required and 25% retainage will be held for off-site stored materials. Paperwork must accompany request two weeks prior to billing to insure adequate time to schedule Owner's inspection.
 - i. Contractor's Construction Safety Plan (Initial Only).

B. Application for Payment at Substantial Completion

The Contractor shall, upon issuance of the Certificate of Substantial Completion, submit his/her Application for payment, which shall reflect any Certificates of Substantial Completion issued previously for Owner occupancy for designated portions of the Work.

Application shall include, but not be limited to and as may be determined by the Owner, the following:

- a. Certificates of Occupancy and such other permits and approvals as may be required.
- b. Warranties (Guarantees) and maintenance agreements as may be applicable.
- c. Changeover information related to Owner's occupancy, use, operation and maintenance.
- d. Final cleaning of paved areas.
- e. Application for Reduction of Retainage, and Consent of Surety.
- f. List of incomplete Work, recognized as exceptions to issuance of Certificate of Substantial Completion.

C. Final Application for Payment

1. Administrative actions and submittals that shall precede or coincide with this final Application for Payment shall include, but not be limited to and as may be determined by the Owner, the following:

- a. Completion of Project Closeout requirements.
- b. Completion of items specified for completion after Substantial Completion.
- c. Prepare and submit to the Owner a list of unsettled claims, as may be applicable.
- d. Transmit to the Owner all required project records including permit drawings, as constructed drawings both on hard copy and in electronic format.
- e. Provide to the Owner evidence that all requisite taxes, fees and similar obligations have been paid in full.
- f. Removal of all temporary facilities and services.
- g. Removal of all surplus materials, rubbish and similar elements.

22. Liquidated Damages

A. The Contractor agrees to commence Work under this Contract on the effective date established as "Notice to Proceed", and to complete the Work in conformance with the allotted time described in the Project Manual. Should the Contractor neglect, fail or refuse to complete the Work within the established Completion date then the Contractor shall pay to the Owner Liquidated Damages in the amount of Five hundred (\$500.00) per day for those damages suffered by the Owner as a result of delay for each and every calendar day that the Contractor has failed to complete the work within the established Completion date. The aforementioned Liquidated Damages are not a penalty, but rather are a pre-agreed liquidation of the losses incurred by the Owner due to failure of the Contractor to complete the Work on time.

23. Termination of Contract

A. The Owner may, by written notice, terminate this Contract in whole or in part at any time, either for the Owner's convenience or because of failure to fulfill the Contract obligations. Upon receipt of such notice, services shall be immediately discontinued (unless the notice directs otherwise) and all materials as may have been accumulated in performed this Contract, whether completed or in process, delivered to the Owner.

B. Contract price shall be made, but no amount shall be allowed for anticipated profit on

unperformed services.

- C. If the termination is due to failure to fulfill the Contractor's obligations, the Owner may take over the work and prosecute the same to completion by contract or otherwise. In such case, the Contractor shall be liable to the Owner for any additional cost occasioned to the Owner thereby.
- D. If, after notice of termination for failure to fulfill its Contract obligations, it is determined that the Contractor had not failed, the termination shall be deemed to have been effected for the convenience of the Owner. In such event, adjustment in the Contract price shall be made as provided in paragraph 21.a of this clause.
- E. The rights and remedies of the Owner provided in this clause are in addition to any other rights and remedies provided by law or under this Contract.

IN WITNESS WHEREOF, the Owner and Contractor hereto have signed and sealed this Contract on the day and date first above written in three counterparts, each deemed an original contract.

TOWN OF RIDGELAND, SC
OWNER

Witness:

By: _____

Title: _____

CONTRACTOR

Witness:

By: _____

Title: _____

(SEAL)

END OF SECTION 00500

SECTION 502
WAGE DETERMINATION
CONSTRUCTION TYPES HEAVY (HEAVY AND WATER AND SEWER LINE)

"General Decision Number: SC20230001 01/06/2023

Superseded General Decision Number: SC20220001

State: South Carolina

Construction Types: Heavy (Heavy and Sewer and Water Line)

Counties: Abbeville, Allendale, Bamberg, Barnwell, Beaufort, Cherokee, Chester, Chesterfield, Clarendon, Colleton, Dillon, Georgetown, Greenwood, Hampton, Jasper, Lancaster, Lee, Marion, Marlboro, McCormick, Newberry, Oconee, Orangeburg, Union and Williamsburg Counties in South Carolina.

DOES NOT INCLUDE SAVANNAH RIVER SITE IN ALLENDALE AND BARNWELL COUNTIES

HEAVY CONSTRUCTION PROJECTS (includes Sewer & Water Lineprojects)

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658.

Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

<p>If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:</p>	<ul style="list-style-type: none"> . Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least \$16.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2023.
<p>If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:</p>	<ul style="list-style-type: none"> . Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least \$12.15 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2023.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <http://www.dol.gov/whd/govcontracts>.

Modification Number

0

Publication Date

01/06/2023

SUSC1990-005 02/08/1990

	Rates	Fringes
Boilermaker (tank work).....	\$ 12.96 **	3.315
Bricklayer.....	\$ 7.25 **	
Carpenter.....	\$ 7.42 **	
Cement mason/concrete finisher.....	\$ 7.25 **	
Ironworker.....	\$ 10.98 **	
Laborers:		
Chain saw.....	\$ 7.25 **	
General.....	\$ 7.25 **	
Pipelayer.....	\$ 7.25 **	
Pipefitter.....	\$ 9.09 **	
Power equipment operators:		
Backhoe.....	\$ 7.25 **	
Bulldozer.....	\$ 7.25 **	
Crane.....	\$ 7.98 **	
Dragline.....	\$ 7.25 **	
Front End Loader.....	.\$ 7.25 **	
Mechanic.....	\$ 7.25 **	
Motor grader.....	\$ 7.25 **	
Pan Scraper.....	.\$ 7.25 **	
Line Construction: line technician.....	\$ 10.08 **	
MANHOLE BUILDER.....	\$ 7.25 **	
TRUCK DRIVER.....	\$ 7.25 **	

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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** Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 (\$16.20) or 13658 (\$12.15). Please see the Note at the top of the wage determination for more information.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at

<https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

SECTION 00504

FEDERAL LABOR STANDARDS PROVISIONS

(Pages 1 – 5)

A. APPLICABILITY

The Project or Program to which the construction work covered by this Contract pertains is being assisted by the United States of America, and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provisions applicable to such Federal assistance.

(1) MINIMUM WAGES

- (i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment, computed at rates not less than those contained in the wage determination of the Secretary of Labor (which is attached hereto and made a part hereof), regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period.

Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR 5.5(a)(1)(ii) and the Davis-Bacon poster (WH1321)) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place, where it can be easily seen by the workers.

(ii) Additional Classifications.

- (A) Any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:
- (1) The work to be performed by the classification requested is not performed by a classification in the wage determination;
 - (2) The classification is utilized in the area by the construction industry; and
 - (3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.
- (B) If the contractor, the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division ("Administrator"), Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget ("OMB") under OMB control number 1235-0023.)
- (C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, or HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1235-0023.)

(D) The wage rate (including fringe benefits, where appropriate) determined pursuant to subparagraphs (1)(ii)(B) or (C) of this paragraph, shall be paid to all workers performing work in the classification under this Contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, that the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. (Approved by the Office of Management and Budget under OMB Control Number 1235-0023.)

(2) **Withholding.** HUD or its designee shall, upon its own action or upon written request of an authorized representative of the U.S. Department of Labor, withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work, all or part of the wages required by the contract, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the contractor, disburse such amounts withheld for and on account of the contractor or subcontractor to the respective employees to whom they are due. The Department of Labor shall make such disbursements in the case of direct Davis-Bacon Act contracts.

(3) **Payrolls and basic records.**

(i) **Maintaining Payroll Records.** Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification(s), hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made, and actual wages paid.

Whenever the Secretary of Labor has found, under 29 CFR 5.5(a)(1)(iv), that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits.

Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs. (Approved by the Office of Management and Budget under OMB Control Numbers 1235-0023 and 1215-0018)

(ii) **Certified Payroll Reports.**

(A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead, the payrolls only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <https://www.dol.gov/agencies/whd/forms> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee, the contractor, or the Wage and Hour Division of the U.S. Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this subparagraph for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to HUD or its designee. (Approved by the Office of Management and Budget under OMB Control Number 1235-0008.)

- (B)** Each payroll submitted shall be accompanied by a “Statement of Compliance,” signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:
- (1)** That the payroll for the payroll period contains the information required to be provided under 29 CFR 5.5(a)(3)(ii), the appropriate information is being maintained under 29 CFR 5.5(a)(3)(i), and that such information is correct and complete;
 - (2)** That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3;
 - (3)** That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract; and
- (C)** The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the “Statement of Compliance” required by subparagraph (a)(3)(ii)(b).
- (D)** The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 3729 of Title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under subparagraph (a)(3)(i) available for inspection, copying, or transcription by authorized representatives of HUD or its designee or the U.S. Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and Trainees.

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency (where appropriate), to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman’s hourly rate) specified in the contractor’s or subcontractor’s registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice’s level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination.

Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program.

If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringe benefits shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

- (ii) **Trainees.** Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed, unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

- (iii) **Equal employment opportunity.** The utilization of apprentices, trainees, and journeymen under 29 CFR Part 5 shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

- (5) **Compliance with Copeland Act requirements.** The contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this Contract.
- (6) **Subcontracts.** The contractor or subcontractor will insert in any subcontracts the clauses contained in subparagraphs (1) through (11) in this paragraph (a) and such other clauses as HUD or its designee may, by appropriate instructions, require, and a copy of the applicable prevailing wage decision, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this paragraph.
- (7) **Contract termination; debarment.** A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.
- (8) **Compliance with Davis-Bacon and Related Act Requirements.** All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this Contract.
- (9) **Disputes concerning labor standards.** Disputes arising out of the labor standards provisions of this Contract shall not be subject to the general disputes clause of this Contract. Such disputes shall be resolved in accordance with the procedures of the U.S. Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and HUD or its designee, the U.S. Department of Labor, or the employees or their representatives.
- (10) **Certification of Eligibility.**
- (i) By entering into this Contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(ii) No part of this Contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(iii) Anyone who knowingly makes, presents, or submits a false, fictitious, or fraudulent statement, representation or certification is subject to criminal, civil and/or administrative sanctions, including fines, penalties, and imprisonment (e.g., 18 U.S.C. §§ 287, 1001, 1010, 1012; 31 U.S.C. §§ 3729, 3802).

(11) Complaints, Proceedings, or Testimony by Employees. No laborer or mechanic, to whom the wage, salary, or other labor standards provisions of this Contract are applicable, shall be discharged or in any other manner discriminated against by the contractor or any subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the labor standards applicable under this Contract to his employer.

B. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The provisions of this paragraph (b) are applicable where the amount of the prime contract exceeds **\$100,000**. As used in this paragraph, the terms “laborers” and “mechanics” include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work, which may require or involve the employment of laborers or mechanics, shall require or permit any such laborer or mechanic in any workweek in which the individual is employed on such work to work in excess of 40 hours in such workweek, unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in subparagraph B(1) of this paragraph, the contractor, and any subcontractor responsible therefor, shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory) for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in subparagraph B(1) of this paragraph, in the sum of **\$27** for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by the clause set forth in subparagraph B(1) of this paragraph. In accordance with the Federal Civil Penalties Inflation Adjustment Act of 1990 (28 U.S.C. § 2461 Note), the Department of Labor adjusts this civil monetary penalty for inflation no later than January 15 each year.

(3) Withholding for unpaid wages and liquidated damages. HUD or its designee shall, upon its own action or upon written request of an authorized representative of the U.S. Department of Labor, withhold or cause to be withheld from any moneys payable on account of work performed by the contractor or subcontractor under any such contract, or any other Federal contract with the same prime contract, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages, as provided in the clause set forth in subparagraph B(2) of this paragraph.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraph B(1) through (4) of this paragraph and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in subparagraphs B(1) through (4) of this paragraph.

C. HEALTH AND SAFETY

The provisions of this paragraph (c) are applicable where the amount of the prime contract exceeds **\$100,000**.

(1) No laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his or her health and safety, as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation.

(2) The contractor shall comply with all regulations issued by the Secretary of Labor pursuant to 29 CFR Part 1926 and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act, (Public Law 91-54, 83 Stat 96), 40 U.S.C. § 3701 et seq.

(3) The contractor shall include the provisions of this paragraph in every subcontract, so that such provisions will be binding on each subcontractor. The contractor shall take such action with respect to any subcontractor as the Secretary of Housing and Urban Development or the Secretary of Labor shall direct as a means of enforcing such provisions.

SECTION 00506
CONTRACT SPECIAL PROVISIONS
(Pages 1 – 24)

00504-1

TOWN OF RIDGELAND
WATER AND SEWER RESILIENCY IMPROVEMENTS

**U. S. DEPARTMENT OF COMMERCE
ECONOMIC DEVELOPMENT ADMINISTRATION**



**EDA CONTRACTING PROVISIONS
FOR CONSTRUCTION PROJECTS**

These EDA Contracting Provisions for Construction Projects (EDA Contracting Provisions) are intended for use by recipients receiving federal assistance from the U. S. Department of Commerce - Economic Development Administration (EDA). They contain provisions specific to EDA and other federal provisions not normally found in non-federal contract documents. The requirements contained herein must be incorporated into all construction contracts and subcontracts funded wholly or in part with federal assistance from EDA.

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20. Conflict of Interest and Other Prohibited Interests
21. New Restrictions on Lobbying
22. Historical and Archaeological Data Preservation
23. Clean Air and Water
24. Use of Lead-Based Paints on Residential Structures
25. Energy Efficiency
26. Environmental Requirements
27. Debarment, Suspension, Ineligibility and Voluntary Exclusions
28. EDA Project Sign
29. Buy America

1. **DEFINITIONS**

Agreement – The written instrument that is evidence of the agreement between the Owner and the Contractor overseeing the Work.

Architect/Engineer - The person or other entity engaged by the Recipient to perform architectural, engineering, design, and other services related to the work as provided for in the contract.

Contract – The entire and integrated written agreement between the Owner and the Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

Contract Documents – Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents.

Contractor – The individual or entity with whom the Owner has entered into the Agreement.

Drawings or Plans – That part of the Contract Documents prepared or approved by the Architect/Engineer that graphically shows the scope, extent, and character of the Work to be performed by the Contractor.

EDA - The United States of America acting through the Economic Development Administration of the U.S. Department of Commerce or any other person designated to act on its behalf. EDA has agreed to provide financial assistance to the Owner, which includes assistance in financing the Work to be performed under this Contract. Notwithstanding EDA's role, nothing in this Contract shall be construed to create any contractual relationship between the Contractor and EDA.

Owner – The individual or entity with whom the Contractor has entered into the Agreement and for whom the Work is to be performed.

Project – The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

Recipient – A non-Federal entity receiving a Federal financial assistance award directly from EDA to carry out an activity under an EDA program, including any EDA-approved successor to the entity.

Specifications – That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.

Subcontractor – An individual or entity having direct contract with the Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.

Work – The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

2. **APPLICABILITY**

The Project to which the construction work covered by this Contract pertains is being assisted by the United States of America through federal assistance provided by the U.S. Department of Commerce - Economic Development Administration (EDA). Neither EDA, nor any of its departments, entities, or employees is a party to this Contract. The following EDA Contracting Provisions are included in this Contract and all subcontracts or related instruments pursuant to the provisions applicable to such federal assistance from EDA.

3. **FEDERALLY REQUIRED CONTRACT PROVISIONS**

(a) All contracts in excess of the simplified acquisition threshold - currently fixed at \$150,000 (*see* 41 U.S.C. §§ 134 and 1908) must address administrative, contractual, or legal remedies in instances where contractors violate or breach contract terms, and provide for such sanctions and penalties as may be appropriate.

(b) All contracts in excess of \$10,000 must address termination for cause and for convenience by the Recipient including the manner by which it will be effected and the basis for settlement.

(c) All construction contracts awarded in excess of \$10,000 by recipients of federal assistance and their contractors or subcontractors shall contain a provision requiring compliance with Executive Order 11246 of September 24, 1965, *Equal Employment Opportunity*, as amended by Executive Order 11375 of October 13, 1967, and Department of Labor implementing regulations at 41 C.F.R. part 60.

(d) All prime construction contracts in excess of \$2,000 awarded by Recipients must include a provision for compliance with the Davis-Bacon Act (40 U.S.C. §§ 3141-3148) as supplemented by Department of Labor regulations at 29 C.F.R. part 5. The contracts must also include a provision for compliance with the Copeland "Anti-Kickback" Act (18 U.S.C. § 874 and 40 U.S.C. § 3145) as supplemented by Department of Labor regulations at 29 C.F.R. part 3.

(e) All contracts awarded by the Recipient in excess of \$100,000 that involve the employment of mechanics or laborers must include a provision for compliance with 40 U.S.C. §§ 3702 and 3704 (the Contract Work Hours and Safety Standards Act) as supplemented by Department of Labor regulations at 29 C.F.R. part 5.

(f) All contracts must include EDA requirements and regulations that involve a requirement on the contractor or sub-contractor to report information to EDA, the Recipient or any other federal agency.

- (g) All contracts must include EDA requirements and regulations pertaining to patent rights with respect to any discovery or invention which arises or is developed in the course of or under such contract.
- (h) All contracts must include EDA requirements and regulations pertaining to copyrights and rights in data.
- (i) All contracts and subgrants in excess of \$150,000 must contain a provision that requires compliance with all applicable standards, orders, or requirements issued under the Clean Air Act (42 U.S.C. § 7401 *et seq.*) and the Federal Water Pollution Control Act (Clean Water Act) (33 U.S.C. § 1251 *et seq.*), and Executive Order 11738, *Providing for Administration of the Clean Air Act and the Federal Water Pollution Control Act With Respect to Federal Contracts, Grants, or Loans*.
- (j) Contracts must contain mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act (42 U.S.C. § 6201).
- (k) Contracts must contain a provision ensuring that contracts are not to be made to parties on the government wide Excluded Parties List System in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 C.F.R. part 180.
- (l) Contracts must contain a provision ensure compliance with the Byrd Anti-Lobbying Amendment (31 U.S.C. § 1352) under which contractors that apply or bid for an award of \$100,000 or more must file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. § 1352. Each tier must also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the non-Federal award.
- (m) If the Recipient is a state agency or agency of a political subdivision of a state, any contract awarded must contain a provision ensuring compliance with section 6002 of the Solid Waste Disposal Act (42 U.S.C. § 6962), as amended by the Resource Conservation and Recovery Act related to the procurement of recovered materials.

4. **REQUIRED PROVISIONS DEEMED INSERTED**

Each and every provision of law and clause required by law to be inserted in this contract shall be deemed to be inserted herein and the contract shall be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon the application of either party the contract shall forthwith be physically amended to make such insertion of correction.

5. **INSPECTION BY EDA REPRESENTATIVES**

The authorized representatives and agents of EDA shall be permitted to inspect all work, materials, payrolls, personnel records, invoices of materials, and other relevant data and records.

6. **EXAMINATION AND RETENTION OF CONTRACTOR'S RECORDS**

(a) The Owner, EDA, or the Comptroller General of the United States, or any of their duly authorized representatives shall, generally until three years after final payment under this contract, have access to and the right to examine any of the Contractor's directly pertinent books, documents, papers, or other records involving transactions related to this contract for the purpose of making audit, examination, excerpts, and transcriptions.

(b) The Contractor agrees to include in first-tier subcontracts under this contract a clause substantially the same as paragraph (a) above. "Subcontract," as used in this clause, excludes purchase orders that do not exceed \$10,000.

(c) The periods of access and examination in paragraphs (a) and (b) above for records relating to (1) appeals under the disputes clause of this contract, (2) litigation or settlement of claims arising from the performance of this contract, or (3) costs and expenses of this contract to which the Owner, EDA, or Comptroller General or any of their duly authorized representatives has taken exception shall continue until disposition of such appeals, litigation, claims, or exceptions.

7. **CONSTRUCTION SCHEDULE AND PERIODIC ESTIMATES**

Immediately after execution and delivery of the contract, and before the first partial payment is made, the Contractor shall deliver to the Owner an estimated construction progress schedule in a form satisfactory to the Owner, showing the proposed dates of commencement and completion of each of the various subdivisions of work required under the Contract Documents and the anticipated amount of each monthly payment that will become due to the Contractor in accordance with the progress schedule. The Contractor also shall furnish the Owner (a) a detailed estimate giving a complete breakdown of the contract price and (b) periodic itemized estimates of work done for the purpose of making partial payments thereon. The costs employed in making up any of these schedules will be used only to determine the basis of partial payments and will not be considered as fixing a basis for additions to or deductions from the contract price.

8. **CONTRACTOR'S TITLE TO MATERIAL**

No materials, supplies, or equipment for the work shall be purchased by the Contractor or by any subcontractor that is subject to any chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller. The Contractor warrants and guarantees that he/she has good title to all work, materials, and equipment used by him/her in the Work, free and clear of all liens, claims, or encumbrances.

9. **INSPECTION AND TESTING OF MATERIALS**

All materials and equipment used in the completion of the Work shall be subject to adequate inspection and testing in accordance with accepted standards. The laboratory or inspection agency shall be selected by the Owner. Materials of construction, particularly those upon which the strength and durability of any structure may depend, shall be subject to inspection and testing to establish conformance with specifications and suitability for intended uses.

10. **"OR EQUAL" CLAUSE**

Whenever a material, article, or piece of equipment is identified in the Contract Documents by reference to manufacturers' or vendors' names, trade names, catalogue numbers, etc., it is intended merely to establish a standard. Any material, article, or equipment of other manufacturers and vendors that will perform adequately the duties imposed by the general design will be considered equally acceptable provided the material, article, or equipment so proposed is, in the opinion of the Architect/Engineer, of equal substance and function. However, such substitution material, article, or equipment shall not be purchased or installed by the Contractor without the Architect/Engineer's written approval.

11. **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 that 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 Architect/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 the Owner in the Contract Documents.

(b) To the fullest extent permitted by Laws and Regulations, the Contractor shall indemnify and hold harmless the Owner and the Architect/Engineer, and the officers, directors, 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.

12. **CLAIMS FOR EXTRA COSTS**

No claims for extra work or cost shall be allowed unless the same was done in pursuance of a written order from the Architect/Engineer approved by the Owner.

13. **CONTRACTORS AND SUBCONTRACTORS INSURANCE**

(a) The Contractor shall not commence work under this Contract until the Contractor has obtained all insurance reasonably required by the Owner, nor shall the Contractor allow any subcontractor to commence work on his/her subcontract until the insurance required of the subcontractor has been so obtained and approved.

(b) Types of insurance normally required are:

- (1) Workmen's Compensation
- (2) Contractor's Public Liability and Property Damage
- (3) Contractor's Vehicle Liability
- (4) Subcontractors' Public Liability, Property Damage and Vehicle Liability
- (5) Builder's Risk (Fire and Extended Coverage)

(c) **Scope of Insurance and Special Hazards:** The insurance obtained, which is described above, shall provide adequate protection for the Contractor and his/her subcontractors, respectively, against damage claims that may arise from operations under this contract, whether such operations be by the insured or by anyone directly or indirectly employed by him/her and also against any of the special hazards that may be encountered in the performance of this Contract.

(d) **Proof of Carriage of Insurance:** The Contractor shall furnish the Owner with certificates showing the type, amount, class of operations covered, effective dates, and dates of expiration of applicable insurance policies.

14. **CONTRACT SECURITY BONDS**

(a) If the amount of this Contract exceeds \$150,000, the Contractor shall furnish a performance bond in an amount at least equal to one hundred percent (100%) of the Contract price as security for the faithful performance of this Contract and also a payment bond in an amount equal to one hundred percent (100%) of the Contract price or in a penal sum not less than that prescribed by State, Territorial, or local law, as security for the payment of all persons performing labor on the Work under this Contract and furnishing materials in connection with this Contract. The performance bond and the payment bond may be in one or in separate instruments in accordance with local law. Before final acceptance, each bond must be approved by EDA. If the amount of this Contract does not exceed \$150,000, the Owner shall specify the amount of the payment and performance bonds.

(b) All bonds shall be in the form prescribed by the Contract Documents except as otherwise provided in applicable laws or regulations, and shall be executed by such sureties as are named in the current list of *Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies* as published in Treasury Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent must be accompanied by a certified copy of the agent's

authority to act. Surety companies executing the bonds must also be authorized to transact business in the state where the Work is located.

15. **LABOR STANDARDS - DAVIS-BACON AND RELATED ACTS**
(as required by section 602 of PWEDA)

(a) **Minimum Wages**

(1) All laborers and mechanics employed or working upon the site of the Work in the construction or development of the Project will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act at 29 C.F.R. part 3, the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at the time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor, which is attached hereto and made a part hereof, regardless of any contractual relationship that may be alleged to exist between the Contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 C.F.R. § 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 C.F.R. § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein, provided that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates determined under 29 C.F.R. § 5.5(a)(1)(ii) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(2) (i) Any class of laborers or mechanics to be employed under the Contract, but not listed in the wage determination, shall be classified in conformance with the wage determination. EDA shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(A) The work to be performed by the classification requested is not performed by a classification in the wage determination;

(B) The classification is utilized in the area by the construction industry; and

(C) The proposed wage rate, including any bona fide fringe benefits, bears a

reasonable relationship to the wage rates contained in the wage determination.

(ii) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and EDA or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by EDA or its designee to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210.

(iii) In the event the Contractor, the laborers or mechanics to be employed in the classification or their representatives, and EDA or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), EDA or its designee shall refer the questions, including the views of all interested parties and the recommendation of EDA or its designee, to the Administrator for determination.

(iv) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(2)(ii) or (iii) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(3) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(4) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, provided, that the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(b) **Withholding**

EDA or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the Contractor under this Contract or any other federal contract with the same prime Contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the Contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper employed or working on the site of the Work in the construction or development of the Project, all or part of the wages required by the Contract, EDA or its designee may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations

have ceased. EDA or its designee may, after written notice to the Contractor, disburse such amounts withheld for and on account of the Contractor or subcontractor to the respective employees to whom they are due. The Comptroller General shall make such disbursements in the case of direct Davis-Bacon Act contracts.

(c) **Payrolls and basic records**

(1) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the Work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the Work in the construction or development of the Project. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 C.F.R. § 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, the plan or program is financially responsible, and the plan or program has been communicated in writing to the laborers or mechanics affected, and provide records that show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(2) (i) For each week in which Contract work is performed, the Contractor shall submit a copy of all payrolls to the Owner for transmission to EDA or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 C.F.R. part 5.5(a)(3)(i). This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose. It may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-00014-1), U.S. Government Printing Office, Washington, D.C. 20402; or downloaded from the U.S. Department of Labor's website at <https://www.dol.gov/whd/forms/wh347.pdf>. The prime Contractor is responsible for the submission of copies of payrolls by all subcontractors

(ii) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the Contract and shall certify the following:

(A) That the payroll for the payroll period contains the information required to be maintained under 29 C.F.R. § 5.5(a)(3)(i) and that such information is correct and complete;

(B) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the Contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 C.F.R. part 3; and

(C) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the Contract.

(iii) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 15(c)(2)(ii) of this section.

(iv) The falsification of any of the above certifications may subject the Contractor or subcontractor to civil or criminal prosecution under section 1001 of Title 18 and section 3729 of Title 31 of the U.S. Code.

(3) The Contractor or subcontractor shall make the records required under paragraph 15(c)(1) of this section available for inspection, copying, or transcription by authorized representatives of EDA or its designee or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit the required records or to make them available, EDA or its designee may, after written notice to the Contractor or Owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 C.F.R. § 5.12.

(d) **Apprentices and Trainees.**

(1) **Apprentices.** Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training (Bureau), or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any

apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a Contractor is performing construction on a Project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(2) **Trainees.** Except as provided in 29 C.F.R. § 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program that has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman's hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(3) **Equal employment opportunity.** The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity

requirements of Executive Order 11246, *Equal Employment Opportunity*, as amended, and 29 C.F.R. part 30.

(e) **Compliance with Copeland Anti-Kickback Act Requirements.** The Contractor shall comply with the Copeland Anti-Kickback Act (18 U.S.C. § 874 and 40 U.S.C. § 3145) as supplemented by Department of Labor regulations (29 C.F.R. part 3, “Contractors and Subcontractors on Public Buildings or Public Works Financed in Whole or in Part by Loans or Grants of the United States”). The Act provides that the Contractor and any subcontractors shall be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which they are otherwise entitled. The Owner shall report all suspected or reported violations to EDA.

(f) **Subcontracts.** The Contractor and any subcontractors will insert in any subcontracts the clauses contained in 29 C.F.R. §§ 5.5(a)(1) through (10) and such other clauses as EDA or its designee may require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime Contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 C.F.R. § 5.5.

(g) **Contract termination; debarment.** The breach of the contract clauses in 29 C.F.R. § 5.5 may be grounds for termination of the contract, and for debarment as a Contractor and a subcontractor as provided in 29 C.F.R. § 5.12.

(h) **Compliance with Davis-Bacon and Related Act Requirements.** All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 C.F.R. parts 1, 3, and 5 are herein incorporated by reference in this contract.

(i) **Disputes concerning labor standards.** Disputes arising out of the labor standards provisions of this Contract shall not be subject to the general disputes clause of this Contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 C.F.R. parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and EDA or its designee, the U.S. Department of Labor, or the employees or their representatives.

(j) **Certification of Eligibility.**

(1) By entering into this Contract, the Contractor certifies that neither it nor any person or firm that has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 C.F.R. § 5.12(a)(1).

(2) No part of this Contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 C.F.R. § 5.12(a)(1).

(3) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. § 1001.

16. **LABOR STANDARDS - CONTRACT WORK HOURS AND SAFETY STANDARDS ACT**

As used in this paragraph, the terms “laborers” and “mechanics” include watchmen and guards.

(a) **Overtime requirements.** No Contractor or subcontractor contracting for any part of the Contract work, which may require or involve the employment of laborers or mechanics, shall require or permit any such laborer or mechanic in any workweek in which that person is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(b) **Violation; liability for unpaid wages, liquidated damages.** In the event of any violation of the clause set forth in paragraph (a) of this section, the Contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such Contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (a) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (a) of this section.

(c) **Withholding for unpaid wages and liquidated damages.** EDA or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any monies payable on account of work performed by the Contractor or subcontractor under any such Contract or any other federal contract with the same prime Contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime Contractor such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b) of this section.

(d) **Subcontracts.** The Contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraphs (a) through (c) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime Contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (a) through (c) of this section.

17. **EQUAL EMPLOYMENT OPPORTUNITY**

(a) The Recipient hereby agrees that it will incorporate or cause to be incorporated into any contract for construction work, or modification thereof, as defined in the regulations of the Secretary of Labor at 41 C.F.R. chapter 60, which is paid for in whole or in part with funds obtained from EDA, the following equal opportunity clause:

During the performance of this contract, the Contractor agrees as follows:

Economic Development Administration
Contracting Provisions for Construction Projects

(1) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training including apprenticeship. The Contractor agrees to post in conspicuous places available to employees and applicants for employment notices to be provided setting forth the provisions of this nondiscrimination clause.

(2) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

(3) The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.

(4) The Contractor will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers representatives of the Contractor's commitments hereunder, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(5) The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965 and of the rules, regulations, and relevant orders of the Secretary of Labor.

(6) The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to its books, records, and accounts by EDA and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(7) In the event of the Contractor's noncompliance with the nondiscrimination clauses of

this Contract or with any of the said rules, regulations, or orders, this Contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts or federally-assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation or order of the Secretary of Labor, or as otherwise provided by law.

(8) The Contractor will include the portion of the sentence immediately preceding paragraph 17(a)(1) and the provisions of paragraphs 17(a)(1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as EDA or the Secretary of Labor may direct as a means of enforcing such provisions, including sanctions for noncompliance. Provided, however, that in the event the Contractor becomes involved in or is threatened with litigation with a subcontractor or vendor as a result of such direction by EDA or the Secretary of Labor, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

(9) The Recipient further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally-assisted construction work. Provided, however, that if the Recipient so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality, or subdivision of such government that does not participate in work on or under the Contract.

(10) The Recipient agrees that it will assist and cooperate actively with EDA and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish EDA and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist EDA in the discharge of the EDA's primary responsibility for securing compliance.

(11) The Recipient further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a Contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by EDA or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the Recipient agrees that if it fails or refuses to comply with these undertakings, EDA may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this EDA financial assistance; refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case

to the Department of Justice for appropriate legal proceedings.

(b) Exemptions to Above Equal Opportunity Clause (41 C.F.R. chapter 60):

(1) Contracts and subcontracts not exceeding \$10,000 (other than Government bills of lading, and other than contracts and subcontracts with depositories of Federal funds in any amount and with financial institutions which are issuing and paying agents for U.S. savings bonds and savings notes) are exempt. The amount of the Contract, rather than the amount of the federal financial assistance, shall govern in determining the applicability of this exemption.

(2) Except in the case of subcontractors for the performance of construction work at the site of construction, the clause shall not be required to be inserted in subcontracts below the second tier.

(3) Contracts and subcontracts not exceeding \$10,000 for standard commercial supplies or raw materials are exempt.

18. **CONTRACTING WITH SMALL, MINORITY AND WOMEN'S BUSINESSES**

(a) If the Contractor intends to let any subcontracts for a portion of the work, the Contractor shall take affirmative steps to assure that small, minority and women's businesses are used when possible as sources of supplies, equipment, construction, and services.

(b) Affirmative steps shall consist of:

(1) Placing qualified small and minority businesses and women's business enterprises on solicitation lists;

(2) Ensuring that small and minority businesses and women's business enterprises are solicited whenever they are potential sources;

(3) Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority businesses and women's business enterprises;

(4) Establishing delivery schedules, where the requirements of the contract permit, which encourage participation by small and minority businesses and women's business enterprises;

(5) Using the services and assistance of the U.S. Small Business Administration, the Minority Business Development Agency of the U.S. Department of Commerce, and State and local governmental small business agencies;

(6) Requiring each party to a subcontract to take the affirmative steps of this section; and

(7) The Contractor is encouraged to procure goods and services from labor surplus area firms.

19. **HEALTH, SAFETY, AND ACCIDENT PREVENTION**

(a) In performing this contract, the Contractor shall:

(1) Ensure that no laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to their health and/or safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation;

(2) Protect the lives, health, and safety of other persons;

(3) Prevent damage to property, materials, supplies, and equipment; and

(4) Avoid work interruptions.

(b) For these purposes, the Contractor shall:

(1) Comply with regulations and standards issued by the Secretary of Labor at 29 C.F.R. part 1926. Failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act (40 U.S.C. §§ 3701 – 3708); and

(2) Include the terms of this clause in every subcontract so that such terms will be binding on each subcontractor.

(c) The Contractor shall maintain an accurate record of exposure data on all accidents incident to work performed under this Contract resulting in death, traumatic injury, occupational disease, or damage to property, materials, supplies, or equipment, and shall report this data in the manner prescribed by 29 C.F.R. part 1904.

(d) The Owner shall notify the Contractor of any noncompliance with these requirements and of the corrective action required. This notice, when delivered to the Contractor or the Contractor's representative at the site of the Work, shall be deemed sufficient notice of the noncompliance and corrective action required. After receiving the notice, the Contractor shall immediately take corrective action. If the Contractor fails or refuses to take corrective action promptly, the Owner may issue an order stopping all or part of the Work until satisfactory corrective action has been taken. The Contractor shall not base any claim or request for equitable adjustment for additional time or money on any stop order issued under these circumstances.

(e) The Contractor shall be responsible for its subcontractors' compliance with the provisions of this clause. The Contractor shall take such action with respect to any subcontract as EDA, or the Secretary of Labor shall direct as a means of enforcing such provisions.

20. **CONFLICT OF INTEREST AND OTHER PROHIBITED INTERESTS**

- (a) No official of the Owner who is authorized in such capacity and on behalf of the Owner to negotiate, make, accept, or approve, or to take part in negotiating, making, accepting, or approving any architectural, engineering, inspection, construction or material supply contract or any subcontract in connection with the construction of the Project, shall become directly or indirectly interested personally in this Contract or in any part hereof.
- (b) No officer, employee, architect, attorney, engineer, or inspector of or for the Owner who is authorized in such capacity and on behalf of the Owner to exercise any legislative, executive, supervisory or other similar functions in connection with the construction of the Project, shall become directly or indirectly interested personally in this Contract or in any part thereof, any material supply contract, subcontract, insurance contract, or any other contract pertaining to the Project.
- (c) The Contractor may not knowingly contract with a supplier or manufacturer if the individual or entity who prepared the Contract Documents has a corporate or financial affiliation with the supplier or manufacturer.
- (d) The Owner's officers, employees, or agents shall not engage in the award or administration of this Contract if a conflict of interest, real or apparent, may be involved. Such a conflict may arise when: (i) the employee, officer or agent; (ii) any member of their immediate family; (iii) their partner or (iv) an organization that employs, or is about to employ, any of the above, has a financial interest in the Contractor. The Owner's officers, employees, or agents shall neither solicit nor accept gratuities, favors, or anything of monetary value from the Contractor or subcontractors.
- (e) If the Owner finds after a notice and hearing that the Contractor, or any of the Contractor's agents or representatives, offered or gave gratuities (in the form of entertainment, gifts, or otherwise) to any official, employee, or agent of the Owner or EDA in an attempt to secure this Contract or favorable treatment in awarding, amending, or making any determinations related to the performance of this Contract, the Owner may, by written notice to the Contractor, terminate this Contract. The Owner may also pursue other rights and remedies that the law or this Contract provides. However, the existence of the facts on which the Owner bases such findings shall be an issue and may be reviewed in proceedings under the dispute resolution provisions of this Contract.
- (f) In the event this Contract is terminated as provided in paragraph (e) of this section, the Owner may pursue the same remedies against the Contractor as it could pursue in the event of a breach of this Contract by the Contractor. As a penalty, in addition to any other damages to which it may be entitled by law, the Owner may pursue exemplary damages in an amount (as determined by the Owner) which shall not be less than three nor more than ten times the costs the Contractor incurs in providing any such gratuities to any such officer or employee.

21. **RESTRICTIONS ON LOBBYING**

(a) This Contract, or subcontract is subject to 31 U.S.C. § 1352, regarding lobbying restrictions. The section is explained in the common rule, 15 C.F.R. part 28 (55 FR 6736-6748, February 26, 1990). Each bidder under this Contract or subcontract is generally prohibited from using federal funds for lobbying the Executive or Legislative Branches of the Federal Government in connection with this EDA Award.

(b) **Contract Clause Threshold:** This Contract Clause regarding lobbying must be included in each bid for a contract or subcontract exceeding \$100,000 of federal funds at any tier under the EDA Award.

(c) **Certification and Disclosure:** Each bidder of a contract or subcontract exceeding \$100,000 of federal funds at any tier under the federal Award must file Form CD-512, *Certification Regarding Lobbying – Lower Tier Covered Transactions*, and, if applicable, Standard Form-LLL, *Disclosure of Lobbying Activities*, regarding the use of any nonfederal funds for lobbying. Certifications shall be retained by the Contractor or subcontractor at the next higher tier. All disclosure forms, however, shall be forwarded from tier to tier until received by the Recipient of the EDA Award, who shall forward all disclosure forms to EDA.

(d) **Continuing Disclosure Requirement:** Each Contractor or subcontractor that is subject to the Certification and Disclosure provision of this Contract Clause is required to file a disclosure form at the end of each calendar quarter in which there occurs any event that requires disclosure or that materially affects the accuracy of the information contained in any disclosure form previously filed by such person. Disclosure forms shall be forwarded from tier to tier until received by the Recipient of the EDA Award, who shall forward all disclosure forms to EDA.

(e) **Indian Tribes, Tribal Organizations, or Other Indian Organizations:** Indian tribes, tribal organizations, or any other Indian organizations, including Alaskan Native organizations, are excluded from the above lobbying restrictions and reporting requirements, but only with respect to expenditures that are by such tribes or organizations for lobbying activities permitted by other federal law. An Indian tribe or organization that is seeking an exclusion from Certification and Disclosure requirements must provide EDA with the citation of the provision or provisions of federal law upon which it relies to conduct lobbying activities that would otherwise be subject to the prohibitions in and to the Certification and Disclosure requirements of 31 U.S.C. § 1352, preferably through an attorney's opinion. Note, also, that a non-Indian subrecipient, contractor, or subcontractor under an award to an Indian tribe, for example, is subject to the restrictions and reporting requirements.

22. **HISTORICAL AND ARCHAEOLOGICAL DATA PRESERVATION**

The Contractor agrees to facilitate the preservation and enhancement of structures and objects of historical, architectural or archaeological significance and when such items are found and/or unearthed during the course of project construction. Any excavation by the Contractor that uncovers an historical or archaeological artifact shall be immediately reported to the Owner and a representative of EDA. Construction shall be temporarily halted pending the notification process and further directions issued by EDA after consultation with the State Historic

Preservation Officer (SHPO) for recovery of the items. *See* the National Historic Preservation Act of 1966 (54 U.S.C. § 300101 *et seq.*, formerly at 16 U.S.C. § 470 *et seq.*) and Executive Order No. 11593 of May 31, 1971.

23. **CLEAN AIR AND WATER**

Applicable to Contracts in Excess of \$150,000

(a) **Definition.** “Facility” means any building, plant, installation, structure, mine, vessel, or other floating craft, location, or site of operations, owned, leased, or supervised by the Contractor or any subcontractor, used in the performance of the Contract or any subcontract. When a location or site of operations includes more than one building, plant, installation, or structure, the entire location or site shall be deemed a facility except when the Administrator, or a designee, of the United States Environmental Protection Agency (EPA) determines that independent facilities are collocated in one geographical area.

(b) In compliance with regulations issued by the EPA, 2 C.F.R. part 1532, pursuant to the Clean Air Act, as amended (42 U.S.C. § 7401 *et seq.*); the Federal Water Pollution Control Act, as amended (33 U.S.C. § 1251 *et seq.*); and Executive Order 11738, the Contractor agrees to:

(1) Not utilize any facility in the performance of this contract or any subcontract which is listed on the Excluded Parties List System, part of the System for Award Management (SAM), pursuant to 2 C.F.R. part 1532 for the duration of time that the facility remains on the list;

(2) Promptly notify the Owner if a facility the Contractor intends to use in the performance of this contract is on the Excluded Parties List System or the Contractor knows that it has been recommended to be placed on the List;

(3) Comply with all requirements of the Clean Air Act and the Federal Water Pollution Control Act, including the requirements of section 114 of the Clean Air Act and section 308 of the Federal Water Pollution Control Act, and all applicable clean air and clean water standards; and

(4) Include or cause to be included the provisions of this clause in every subcontract and take such action as EDA may direct as a means of enforcing such provisions.

24. **USE OF LEAD-BASED PAINTS ON RESIDENTIAL STRUCTURES**

(a) If the work under this Contract involves construction or rehabilitation of residential structures over \$5,000, the Contractor shall comply with the Lead-based Paint Poisoning Prevention Act (42 U.S.C. § 4831). The Contractor shall assure that paint or other surface coatings used in a residential property does not contain lead equal to or in excess of 1.0 milligram per square centimeter or 0.5 percent by weight or 5,000 parts per million (ppm) by weight. For purposes of this section, “residential property” means a dwelling unit, common areas, building exterior surfaces, and any surrounding land, including outbuildings, fences and play equipment affixed to the land, belonging to an owner and available for use by residents, but not

including land used for agricultural, commercial, industrial or other non-residential purposes, and not including paint on the pavement of parking lots, garages, or roadways.

- (b) As a condition to receiving assistance under PWEDA, recipients shall assure that the restriction against the use of lead-based paint is included in all contracts and subcontracts involving the use of federal funds.

25. **ENERGY EFFICIENCY**

The Contractor shall comply with all standards and policies relating to energy efficiency which are contained in the energy conservation plan issued in compliance with the Energy Policy and Conservation Act (42 U.S.C. § 6201) for the State in which the Work under the Contract is performed.

26. **ENVIRONMENTAL REQUIREMENTS**

When constructing a Project involving trenching and/or other related earth excavations, the Contractor shall comply with the following environmental constraints:

- (1) **Wetlands.** When disposing of excess, spoil, or other construction materials on public or private property, the Contractor shall not fill in or otherwise convert wetlands.
- (2) **Floodplains.** When disposing of excess, spoil, or other construction materials on public or private property, the Contractor shall not fill in or otherwise convert 100 year floodplain areas delineated on the latest Federal Emergency Management Agency (FEMA) Floodplain Maps, or other appropriate maps, i.e., alluvial soils on Natural Resource Conservation Service (NRCS) Soil Survey Maps.
- (3) **Endangered Species.** The Contractor shall comply with the Endangered Species Act, which provides for the protection of endangered and/or threatened species and critical habitat. Should any evidence of the presence of endangered and/or threatened species or their critical habitat be brought to the attention of the Contractor, the Contractor will immediately report this evidence to the Owner and a representative of EDA. Construction shall be temporarily halted pending the notification process and further directions issued by EDA after consultation with the U.S. Fish and Wildlife Service.

27. **DEBARMENT, SUSPENSION, INELIGIBILITY, AND VOLUNTARY EXCLUSIONS**

As required by Executive Orders 12549 and 12689, *Debarment and Suspension*, 2 C.F.R. Part 180 and implemented by the Department of Commerce at 2 C.F.R. part 1326, for prospective participants in lower tier covered transactions (except subcontracts for goods or services under the \$25,000 small purchase threshold unless the subrecipient will have a critical influence on or substantive control over the award), the Contractor agrees that:

- (1) By entering into this Contract, the Contractor and subcontractors certify, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared Economic Development Administration Contracting Provisions for Construction Projects

ineligible, or voluntarily excluded from participation in this Contract by any federal department or agency.

(2) Where the Contractor or subcontractors are unable to certify to any of the statements in this certification, the Contractor or subcontractors shall attach an explanation to this bid.

See also 2 C.F.R. part 180 and 2 C.F.R. § 200.342.

28. **EDA PROJECT SIGN**

The Contractor shall supply, erect, and maintain in good condition a Project sign according to the specifications provided by EDA. To the extent practical, the sign should be a free standing sign. Project signs shall not be located on public highway rights-of-way. Location and height of signs will be coordinated with the local agency responsible for highway or street safety in the Project area, if any possibility exists for obstructing vehicular traffic line of sight. Whenever the EDA site sign specifications conflict with State law or local ordinances, the EDA Regional Director will permit such conflicting specifications to be modified so as to comply with State law or local ordinance.

29. **BUY AMERICA**

To the greatest extent practicable, contractors are encouraged to purchase American-made equipment and products with funding provided under EDA financial assistance awards.

SECTION 00508

DEBARMENT CERTIFICATION

00508-1

TOWN OF RIDGELAND
WATER AND SEWER RESILIENCY IMPROVEMENTS

10/16

**CERTIFICATION REGARDING DEBARMENT, SUSPENSION,
INELIGIBILITY AND VOLUNTARY EXCLUSION LOWER TIER COVERED TRANSACTIONS**

This certification is required by the regulations implementing Executive Orders 12549 and 12689, Debarment and Suspension, and 2 CFR Part 200, Participants' responsibilities.)

(BEFORE COMPLETING CERTIFICATION, READ INSTRUCTIONS BELOW)

- (1) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principles are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.
- (2) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

Grant Number: 04-79-07454

Name of Participant: _____

Address of Participant: _____

Name and Title of Authorized Representative	Signature	Date
<p>1. By signing and submitting this proposal, the prospective lower tier participant is providing the certification set out below.</p> <p>2. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.</p> <p>3. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.</p> <p>4. The terms "covered transaction", "debarred", "suspended", "ineligible", "lower tier covered transaction", "participant", "person", "primary covered transaction", "principal", "proposal", and "voluntarily excluded", as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Orders 12549 and 12689.</p> <p>5. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.</p> <p>6. The prospective lower tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion -- Lower Tier Covered Transactions", without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.</p> <p>7. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may check the System for Award Management (SAM).</p> <p>8. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.</p> <p>9. Except for transactions authorized under paragraph 5 of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.</p>		

SECTION 00509

**W-9 REQUEST FOR TAXPAYER IDENTIFICATION NUMBER AND
CERTIFICATION**

00509-1

TOWN OF RIDGELAND
WATER AND SEWER RESILIENCY IMPROVEMENTS

Request for Taxpayer Identification Number and Certification

**Give Form to the
 requester. Do not
 send to the IRS.**

▶ Go to www.irs.gov/FormW9 for instructions and the latest information.

Print or type. See Specific Instructions on page 3.	1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.	
	2 Business name/disregarded entity name, if different from above	
	3 Check appropriate box for federal tax classification of the person whose name is entered on line 1. Check only one of the following seven boxes.	4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):
	<input type="checkbox"/> Individual/sole proprietor or single-member LLC <input type="checkbox"/> C Corporation <input type="checkbox"/> S Corporation <input type="checkbox"/> Partnership <input type="checkbox"/> Trust/estate	Exempt payee code (if any) _____
	<input type="checkbox"/> Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ▶ _____ Note: Check the appropriate box in the line above for the tax classification of the single-member owner. Do not check LLC if the LLC is classified as a single-member LLC that is disregarded from the owner unless the owner of the LLC is another LLC that is not disregarded from the owner for U.S. federal tax purposes. Otherwise, a single-member LLC that is disregarded from the owner should check the appropriate box for the tax classification of its owner.	Exemption from FATCA reporting code (if any) _____
	<input type="checkbox"/> Other (see instructions) ▶ _____	<i>(Applies to accounts maintained outside the U.S.)</i>
	5 Address (number, street, and apt. or suite no.) See instructions.	Requester's name and address (optional)
6 City, state, and ZIP code		
7 List account number(s) here (optional)		

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN*, later.

Note: If the account is in more than one name, see the instructions for line 1. Also see *What Name and Number To Give the Requester* for guidelines on whose number to enter.

Social security number											
				-			-				
or											
Employer identification number											
				-							

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

Sign Here	Signature of U.S. person ▶	Date ▶
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General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to www.irs.gov/FormW9.

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following.

- Form 1099-INT (interest earned or paid)

- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding, later.

By signing the filled-out form, you:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
2. Certify that you are not subject to backup withholding, or
3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income, and
4. Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting, is correct. See *What is FATCA reporting*, later, for further information.

Note: If you are a U.S. person and a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien;
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States;
- An estate (other than a foreign estate); or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax under section 1446 on any foreign partners' share of effectively connected taxable income from such business. Further, in certain cases where a Form W-9 has not been received, the rules under section 1446 require a partnership to presume that a partner is a foreign person, and pay the section 1446 withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid section 1446 withholding on your share of partnership income.

In the cases below, the following person must give Form W-9 to the partnership for purposes of establishing its U.S. status and avoiding withholding on its allocable share of net income from the partnership conducting a trade or business in the United States.

- In the case of a disregarded entity with a U.S. owner, the U.S. owner of the disregarded entity and not the entity;
- In the case of a grantor trust with a U.S. grantor or other U.S. owner, generally, the U.S. grantor or other U.S. owner of the grantor trust and not the trust; and
- In the case of a U.S. trust (other than a grantor trust), the U.S. trust (other than a grantor trust) and not the beneficiaries of the trust.

Foreign person. If you are a foreign person or the U.S. branch of a foreign bank that has elected to be treated as a U.S. person, do not use Form W-9. Instead, use the appropriate Form W-8 or Form 8233 (see Pub. 515, *Withholding of Tax on Nonresident Aliens and Foreign Entities*).

Nonresident alien who becomes a resident alien. Generally, only a nonresident alien individual may use the terms of a tax treaty to reduce or eliminate U.S. tax on certain types of income. However, most tax treaties contain a provision known as a "saving clause." Exceptions specified in the saving clause may permit an exemption from tax to continue for certain types of income even after the payee has otherwise become a U.S. resident alien for tax purposes.

If you are a U.S. resident alien who is relying on an exception contained in the saving clause of a tax treaty to claim an exemption from U.S. tax on certain types of income, you must attach a statement to Form W-9 that specifies the following five items.

1. The treaty country. Generally, this must be the same treaty under which you claimed exemption from tax as a nonresident alien.
2. The treaty article addressing the income.
3. The article number (or location) in the tax treaty that contains the saving clause and its exceptions.
4. The type and amount of income that qualifies for the exemption from tax.
5. Sufficient facts to justify the exemption from tax under the terms of the treaty article.

Example. Article 20 of the U.S.-China income tax treaty allows an exemption from tax for scholarship income received by a Chinese student temporarily present in the United States. Under U.S. law, this student will become a resident alien for tax purposes if his or her stay in the United States exceeds 5 calendar years. However, paragraph 2 of the first Protocol to the U.S.-China treaty (dated April 30, 1984) allows the provisions of Article 20 to continue to apply even after the Chinese student becomes a resident alien of the United States. A Chinese student who qualifies for this exception (under paragraph 2 of the first protocol) and is relying on this exception to claim an exemption from tax on his or her scholarship or fellowship income would attach to Form W-9 a statement that includes the information described above to support that exemption.

If you are a nonresident alien or a foreign entity, give the requester the appropriate completed Form W-8 or Form 8233.

Backup Withholding

What is backup withholding? Persons making certain payments to you must under certain conditions withhold and pay to the IRS 24% of such payments. This is called "backup withholding." Payments that may be subject to backup withholding include interest, tax-exempt interest, dividends, broker and barter exchange transactions, rents, royalties, nonemployee pay, payments made in settlement of payment card and third party network transactions, and certain payments from fishing boat operators. Real estate transactions are not subject to backup withholding.

You will not be subject to backup withholding on payments you receive if you give the requester your correct TIN, make the proper certifications, and report all your taxable interest and dividends on your tax return.

Payments you receive will be subject to backup withholding if:

1. You do not furnish your TIN to the requester,
2. You do not certify your TIN when required (see the instructions for Part II for details),
3. The IRS tells the requester that you furnished an incorrect TIN,
4. The IRS tells you that you are subject to backup withholding because you did not report all your interest and dividends on your tax return (for reportable interest and dividends only), or
5. You do not certify to the requester that you are not subject to backup withholding under 4 above (for reportable interest and dividend accounts opened after 1983 only).

Certain payees and payments are exempt from backup withholding. See *Exempt payee code*, later, and the separate Instructions for the Requester of Form W-9 for more information.

Also see *Special rules for partnerships*, earlier.

What is FATCA Reporting?

The Foreign Account Tax Compliance Act (FATCA) requires a participating foreign financial institution to report all United States account holders that are specified United States persons. Certain payees are exempt from FATCA reporting. See *Exemption from FATCA reporting code*, later, and the Instructions for the Requester of Form W-9 for more information.

Updating Your Information

You must provide updated information to any person to whom you claimed to be an exempt payee if you are no longer an exempt payee and anticipate receiving reportable payments in the future from this person. For example, you may need to provide updated information if you are a C corporation that elects to be an S corporation, or if you no longer are tax exempt. In addition, you must furnish a new Form W-9 if the name or TIN changes for the account; for example, if the grantor of a grantor trust dies.

Penalties

Failure to furnish TIN. If you fail to furnish your correct TIN to a requester, you are subject to a penalty of \$50 for each such failure unless your failure is due to reasonable cause and not to willful neglect.

Civil penalty for false information with respect to withholding. If you make a false statement with no reasonable basis that results in no backup withholding, you are subject to a \$500 penalty.

Criminal penalty for falsifying information. Willfully falsifying certifications or affirmations may subject you to criminal penalties including fines and/or imprisonment.

Misuse of TINs. If the requester discloses or uses TINs in violation of federal law, the requester may be subject to civil and criminal penalties.

Specific Instructions

Line 1

You must enter one of the following on this line; **do not** leave this line blank. The name should match the name on your tax return.

If this Form W-9 is for a joint account (other than an account maintained by a foreign financial institution (FFI)), list first, and then circle, the name of the person or entity whose number you entered in Part I of Form W-9. If you are providing Form W-9 to an FFI to document a joint account, each holder of the account that is a U.S. person must provide a Form W-9.

a. **Individual.** Generally, enter the name shown on your tax return. If you have changed your last name without informing the Social Security Administration (SSA) of the name change, enter your first name, the last name as shown on your social security card, and your new last name.

Note: ITIN applicant: Enter your individual name as it was entered on your Form W-7 application, line 1a. This should also be the same as the name you entered on the Form 1040/1040A/1040EZ you filed with your application.

b. **Sole proprietor or single-member LLC.** Enter your individual name as shown on your 1040/1040A/1040EZ on line 1. You may enter your business, trade, or “doing business as” (DBA) name on line 2.

c. **Partnership, LLC that is not a single-member LLC, C corporation, or S corporation.** Enter the entity’s name as shown on the entity’s tax return on line 1 and any business, trade, or DBA name on line 2.

d. **Other entities.** Enter your name as shown on required U.S. federal tax documents on line 1. This name should match the name shown on the charter or other legal document creating the entity. You may enter any business, trade, or DBA name on line 2.

e. **Disregarded entity.** For U.S. federal tax purposes, an entity that is disregarded as an entity separate from its owner is treated as a “disregarded entity.” See Regulations section 301.7701-2(c)(2)(iii). Enter the owner’s name on line 1. The name of the entity entered on line 1 should never be a disregarded entity. The name on line 1 should be the name shown on the income tax return on which the income should be reported. For example, if a foreign LLC that is treated as a disregarded entity for U.S. federal tax purposes has a single owner that is a U.S. person, the U.S. owner’s name is required to be provided on line 1. If the direct owner of the entity is also a disregarded entity, enter the first owner that is not disregarded for federal tax purposes. Enter the disregarded entity’s name on line 2, “Business name/disregarded entity name.” If the owner of the disregarded entity is a foreign person, the owner must complete an appropriate Form W-8 instead of a Form W-9. This is the case even if the foreign person has a U.S. TIN.

Line 2

If you have a business name, trade name, DBA name, or disregarded entity name, you may enter it on line 2.

Line 3

Check the appropriate box on line 3 for the U.S. federal tax classification of the person whose name is entered on line 1. Check only one box on line 3.

IF the entity/person on line 1 is a(n) . . .	THEN check the box for . . .
• Corporation	Corporation
• Individual • Sole proprietorship, or • Single-member limited liability company (LLC) owned by an individual and disregarded for U.S. federal tax purposes.	Individual/sole proprietor or single-member LLC
• LLC treated as a partnership for U.S. federal tax purposes, • LLC that has filed Form 8832 or 2553 to be taxed as a corporation, or • LLC that is disregarded as an entity separate from its owner but the owner is another LLC that is not disregarded for U.S. federal tax purposes.	Limited liability company and enter the appropriate tax classification. (P= Partnership; C= C corporation; or S= S corporation)
• Partnership	Partnership
• Trust/estate	Trust/estate

Line 4, Exemptions

If you are exempt from backup withholding and/or FATCA reporting, enter in the appropriate space on line 4 any code(s) that may apply to you.

Exempt payee code.

- Generally, individuals (including sole proprietors) are not exempt from backup withholding.
- Except as provided below, corporations are exempt from backup withholding for certain payments, including interest and dividends.
- Corporations are not exempt from backup withholding for payments made in settlement of payment card or third party network transactions.
- Corporations are not exempt from backup withholding with respect to attorneys’ fees or gross proceeds paid to attorneys, and corporations that provide medical or health care services are not exempt with respect to payments reportable on Form 1099-MISC.

The following codes identify payees that are exempt from backup withholding. Enter the appropriate code in the space in line 4.

- 1—An organization exempt from tax under section 501(a), any IRA, or a custodial account under section 403(b)(7) if the account satisfies the requirements of section 401(f)(2)
- 2—The United States or any of its agencies or instrumentalities
- 3—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities
- 4—A foreign government or any of its political subdivisions, agencies, or instrumentalities
- 5—A corporation
- 6—A dealer in securities or commodities required to register in the United States, the District of Columbia, or a U.S. commonwealth or possession
- 7—A futures commission merchant registered with the Commodity Futures Trading Commission
- 8—A real estate investment trust
- 9—An entity registered at all times during the tax year under the Investment Company Act of 1940
- 10—A common trust fund operated by a bank under section 584(a)
- 11—A financial institution
- 12—A middleman known in the investment community as a nominee or custodian
- 13—A trust exempt from tax under section 664 or described in section 4947

The following chart shows types of payments that may be exempt from backup withholding. The chart applies to the exempt payees listed above, 1 through 13.

IF the payment is for . . .	THEN the payment is exempt for . . .
Interest and dividend payments	All exempt payees except for 7
Broker transactions	Exempt payees 1 through 4 and 6 through 11 and all C corporations. S corporations must not enter an exempt payee code because they are exempt only for sales of noncovered securities acquired prior to 2012.
Barter exchange transactions and patronage dividends	Exempt payees 1 through 4
Payments over \$600 required to be reported and direct sales over \$5,000 ¹	Generally, exempt payees 1 through 5 ²
Payments made in settlement of payment card or third party network transactions	Exempt payees 1 through 4

¹ See Form 1099-MISC, Miscellaneous Income, and its instructions.

² However, the following payments made to a corporation and reportable on Form 1099-MISC are not exempt from backup withholding: medical and health care payments, attorneys' fees, gross proceeds paid to an attorney reportable under section 6045(f), and payments for services paid by a federal executive agency.

Exemption from FATCA reporting code. The following codes identify payees that are exempt from reporting under FATCA. These codes apply to persons submitting this form for accounts maintained outside of the United States by certain foreign financial institutions. Therefore, if you are only submitting this form for an account you hold in the United States, you may leave this field blank. Consult with the person requesting this form if you are uncertain if the financial institution is subject to these requirements. A requester may indicate that a code is not required by providing you with a Form W-9 with "Not Applicable" (or any similar indication) written or printed on the line for a FATCA exemption code.

A—An organization exempt from tax under section 501(a) or any individual retirement plan as defined in section 7701(a)(37)

B—The United States or any of its agencies or instrumentalities

C—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities

D—A corporation the stock of which is regularly traded on one or more established securities markets, as described in Regulations section 1.1472-1(c)(1)(i)

E—A corporation that is a member of the same expanded affiliated group as a corporation described in Regulations section 1.1472-1(c)(1)(i)

F—A dealer in securities, commodities, or derivative financial instruments (including notional principal contracts, futures, forwards, and options) that is registered as such under the laws of the United States or any state

G—A real estate investment trust

H—A regulated investment company as defined in section 851 or an entity registered at all times during the tax year under the Investment Company Act of 1940

I—A common trust fund as defined in section 584(a)

J—A bank as defined in section 581

K—A broker

L—A trust exempt from tax under section 664 or described in section 4947(a)(1)

M—A tax exempt trust under a section 403(b) plan or section 457(g) plan

Note: You may wish to consult with the financial institution requesting this form to determine whether the FATCA code and/or exempt payee code should be completed.

Line 5

Enter your address (number, street, and apartment or suite number). This is where the requester of this Form W-9 will mail your information returns. If this address differs from the one the requester already has on file, write NEW at the top. If a new address is provided, there is still a chance the old address will be used until the payor changes your address in their records.

Line 6

Enter your city, state, and ZIP code.

Part I. Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. If you are a resident alien and you do not have and are not eligible to get an SSN, your TIN is your IRS individual taxpayer identification number (ITIN). Enter it in the social security number box. If you do not have an ITIN, see *How to get a TIN* below.

If you are a sole proprietor and you have an EIN, you may enter either your SSN or EIN.

If you are a single-member LLC that is disregarded as an entity separate from its owner, enter the owner's SSN (or EIN, if the owner has one). Do not enter the disregarded entity's EIN. If the LLC is classified as a corporation or partnership, enter the entity's EIN.

Note: See *What Name and Number To Give the Requester*, later, for further clarification of name and TIN combinations.

How to get a TIN. If you do not have a TIN, apply for one immediately. To apply for an SSN, get Form SS-5, Application for a Social Security Card, from your local SSA office or get this form online at www.SSA.gov. You may also get this form by calling 1-800-772-1213. Use Form W-7, Application for IRS Individual Taxpayer Identification Number, to apply for an ITIN, or Form SS-4, Application for Employer Identification Number, to apply for an EIN. You can apply for an EIN online by accessing the IRS website at www.irs.gov/Businesses and clicking on Employer Identification Number (EIN) under Starting a Business. Go to www.irs.gov/Forms to view, download, or print Form W-7 and/or Form SS-4. Or, you can go to www.irs.gov/OrderForms to place an order and have Form W-7 and/or SS-4 mailed to you within 10 business days.

If you are asked to complete Form W-9 but do not have a TIN, apply for a TIN and write "Applied For" in the space for the TIN, sign and date the form, and give it to the requester. For interest and dividend payments, and certain payments made with respect to readily tradable instruments, generally you will have 60 days to get a TIN and give it to the requester before you are subject to backup withholding on payments. The 60-day rule does not apply to other types of payments. You will be subject to backup withholding on all such payments until you provide your TIN to the requester.

Note: Entering "Applied For" means that you have already applied for a TIN or that you intend to apply for one soon.

Caution: A disregarded U.S. entity that has a foreign owner must use the appropriate Form W-8.

Part II. Certification

To establish to the withholding agent that you are a U.S. person, or resident alien, sign Form W-9. You may be requested to sign by the withholding agent even if item 1, 4, or 5 below indicates otherwise.

For a joint account, only the person whose TIN is shown in Part I should sign (when required). In the case of a disregarded entity, the person identified on line 1 must sign. Exempt payees, see *Exempt payee code*, earlier.

Signature requirements. Complete the certification as indicated in items 1 through 5 below.

1. Interest, dividend, and barter exchange accounts opened before 1984 and broker accounts considered active during 1983.

You must give your correct TIN, but you do not have to sign the certification.

2. Interest, dividend, broker, and barter exchange accounts opened after 1983 and broker accounts considered inactive during 1983.

You must sign the certification or backup withholding will apply. If you are subject to backup withholding and you are merely providing your correct TIN to the requester, you must cross out item 2 in the certification before signing the form.

3. Real estate transactions.

You must sign the certification. You may cross out item 2 of the certification.

4. Other payments. You must give your correct TIN, but you do not have to sign the certification unless you have been notified that you have previously given an incorrect TIN. "Other payments" include payments made in the course of the requester's trade or business for rents, royalties, goods (other than bills for merchandise), medical and health care services (including payments to corporations), payments to a nonemployee for services, payments made in settlement of payment card and third party network transactions, payments to certain fishing boat crew members and fishermen, and gross proceeds paid to attorneys (including payments to corporations).

5. Mortgage interest paid by you, acquisition or abandonment of secured property, cancellation of debt, qualified tuition program payments (under section 529), ABLE accounts (under section 529A), IRA, Coverdell ESA, Archer MSA or HSA contributions or distributions, and pension distributions. You must give your correct TIN, but you do not have to sign the certification.

What Name and Number To Give the Requester

For this type of account:	Give name and SSN of:
1. Individual	The individual
2. Two or more individuals (joint account) other than an account maintained by an FFI	The actual owner of the account or, if combined funds, the first individual on the account ¹
3. Two or more U.S. persons (joint account maintained by an FFI)	Each holder of the account
4. Custodial account of a minor (Uniform Gift to Minors Act)	The minor ²
5. a. The usual revocable savings trust (grantor is also trustee)	The grantor-trustee ¹
b. So-called trust account that is not a legal or valid trust under state law	The actual owner ¹
6. Sole proprietorship or disregarded entity owned by an individual	The owner ³
7. Grantor trust filing under Optional Form 1099 Filing Method 1 (see Regulations section 1.671-4(b)(2)(i)(A))	The grantor*
For this type of account:	Give name and EIN of:
8. Disregarded entity not owned by an individual	The owner
9. A valid trust, estate, or pension trust	Legal entity ⁴
10. Corporation or LLC electing corporate status on Form 8832 or Form 2553	The corporation
11. Association, club, religious, charitable, educational, or other tax-exempt organization	The organization
12. Partnership or multi-member LLC	The partnership
13. A broker or registered nominee	The broker or nominee

For this type of account:	Give name and EIN of:
14. Account with the Department of Agriculture in the name of a public entity (such as a state or local government, school district, or prison) that receives agricultural program payments	The public entity
15. Grantor trust filing under the Form 1041 Filing Method or the Optional Form 1099 Filing Method 2 (see Regulations section 1.671-4(b)(2)(i)(B))	The trust

¹ List first and circle the name of the person whose number you furnish. If only one person on a joint account has an SSN, that person's number must be furnished.

² Circle the minor's name and furnish the minor's SSN.

³ You must show your individual name and you may also enter your business or DBA name on the "Business name/disregarded entity" name line. You may use either your SSN or EIN (if you have one), but the IRS encourages you to use your SSN.

⁴ List first and circle the name of the trust, estate, or pension trust. (Do not furnish the TIN of the personal representative or trustee unless the legal entity itself is not designated in the account title.) Also see *Special rules for partnerships*, earlier.

*Note: The grantor also must provide a Form W-9 to trustee of trust.

Note: If no name is circled when more than one name is listed, the number will be considered to be that of the first name listed.

Secure Your Tax Records From Identity Theft

Identity theft occurs when someone uses your personal information such as your name, SSN, or other identifying information, without your permission, to commit fraud or other crimes. An identity thief may use your SSN to get a job or may file a tax return using your SSN to receive a refund.

To reduce your risk:

- Protect your SSN,
- Ensure your employer is protecting your SSN, and
- Be careful when choosing a tax preparer.

If your tax records are affected by identity theft and you receive a notice from the IRS, respond right away to the name and phone number printed on the IRS notice or letter.

If your tax records are not currently affected by identity theft but you think you are at risk due to a lost or stolen purse or wallet, questionable credit card activity or credit report, contact the IRS Identity Theft Hotline at 1-800-908-4490 or submit Form 14039.

For more information, see Pub. 5027, Identity Theft Information for Taxpayers.

Victims of identity theft who are experiencing economic harm or a systemic problem, or are seeking help in resolving tax problems that have not been resolved through normal channels, may be eligible for Taxpayer Advocate Service (TAS) assistance. You can reach TAS by calling the TAS toll-free case intake line at 1-877-777-4778 or TTY/TDD 1-800-829-4059.

Protect yourself from suspicious emails or phishing schemes.

Phishing is the creation and use of email and websites designed to mimic legitimate business emails and websites. The most common act is sending an email to a user falsely claiming to be an established legitimate enterprise in an attempt to scam the user into surrendering private information that will be used for identity theft.

The IRS does not initiate contacts with taxpayers via emails. Also, the IRS does not request personal detailed information through email or ask taxpayers for the PIN numbers, passwords, or similar secret access information for their credit card, bank, or other financial accounts.

If you receive an unsolicited email claiming to be from the IRS, forward this message to phishing@irs.gov. You may also report misuse of the IRS name, logo, or other IRS property to the Treasury Inspector General for Tax Administration (TIGTA) at 1-800-366-4484. You can forward suspicious emails to the Federal Trade Commission at spam@uce.gov or report them at www.ftc.gov/complaint. You can contact the FTC at www.ftc.gov/idtheft or 877-IDTHEFT (877-438-4338). If you have been the victim of identity theft, see www.IdentityTheft.gov and Pub. 5027.

Visit www.irs.gov/IdentityTheft to learn more about identity theft and how to reduce your risk.

Privacy Act Notice

Section 6109 of the Internal Revenue Code requires you to provide your correct TIN to persons (including federal agencies) who are required to file information returns with the IRS to report interest, dividends, or certain other income paid to you; mortgage interest you paid; the acquisition or abandonment of secured property; the cancellation of debt; or contributions you made to an IRA, Archer MSA, or HSA. The person collecting this form uses the information on the form to file information returns with the IRS, reporting the above information. Routine uses of this information include giving it to the Department of Justice for civil and criminal litigation and to cities, states, the District of Columbia, and U.S. commonwealths and possessions for use in administering their laws. The information also may be disclosed to other countries under a treaty, to federal and state agencies to enforce civil and criminal laws, or to federal law enforcement and intelligence agencies to combat terrorism. You must provide your TIN whether or not you are required to file a tax return. Under section 3406, payers must generally withhold a percentage of taxable interest, dividend, and certain other payments to a payee who does not give a TIN to the payer. Certain penalties may also apply for providing false or fraudulent information.

SECTION 00520

ILLEGAL IMMIGRATION REFORM ACT CONTRACTOR CERTIFICATION

00520-1

TOWN OF RIDGELAND
WATER AND SEWER RESILIENCY IMPROVEMENTS

SOUTH CAROLINA ILLEGAL IMMIGRATION REFORM ACT
CONTRACTOR CERTIFICATION

In accordance with the requirements of the South Carolina Illegal Immigration Reform Act, _____ (“Contractor”) hereby certifies that it is currently in compliance with the requirements of Title 8, Chapter 14 of the S.C. Code Annotated and will remain in compliance with such requirements throughout the term of its contract with Town of Ridgeland (“Owner”).

Contractor hereby acknowledges that in order to comply with requirements of S.C. Code Annotated Section 8-14-20(B), it will:

1. Register and participate in the federal work authorization program (E-Verify) to verify the employment authorization of all new employees; and require agreement from its subcontractors, and through the subcontractors, the sub-subcontractors, to register and participate in the federal verification the employment authorization of all new employees.

Contractor agrees to provide to Owner any documentation required to establish the applicability of the South Carolina Illegal Immigration Reform Act to the Contractor, subcontractor, or sub-subcontractor. Contractor further agrees that it will provide Owner with any documentation required to establish that the Contractor and any subcontractors or sub-subcontractors are in compliance with the requirements of Title 8, Chapter 14 of the S.C. Code Annotated.

Date: _____

By: _____

Title: _____

SECTION 00524

NOTICE OF INTENT TO AWARD

00524-1

TOWN OF RIDGELAND
WATER AND SEWER RESILIENCY IMPROVEMENTS

NOTICE OF INTENT TO AWARD

OWNER: Town of Ridgeland
(Name)

PROJECT: 04-79-07454 Water and Sewer Resiliency Improvements
(Number) (Name)

TO ALL BIDDERS

This is to notify all bidders that it is the intent of the owner to award a contract as follows:

NAME OF BIDDER: _____

DATES BIDS WERE RECEIVED: _____

AMOUNT OF BASE BID: \$ _____

ALTERNATE(S) ACCEPTED: # \$ _____

TOTAL AMOUNT OF BASE BID WITH ALTERNATE(S): \$ _____

The owner has determined that the above named bidder is responsible and has submitted the lowest responsive bid. The owner may enter into a contract with this bidder subject to the contract review by Department of Commerce, Grants Administration.

Dennis E. Averkin
(PRINT OR TYPE NAME)

Town Administrator
(AWARD AUTHORITY TITLE)

(SIGNATURE)

(DATE POSTED)

.....
POST A COPY OF THIS FORM AT THE LOCATION ANNOUNCED AT BID OPENING

SECTION 00525

NOTICE OF AWARD

00525-1

TOWN OF RIDGELAND
WATER AND SEWER RESILIENCY IMPROVEMENTS

NOTICE OF AWARD

TO: **Company**
 Address

OWNER: **Town of Ridgeland**
 PO Box 1119, Ridgeland, SC 29936

PROJECT DESCRIPTION:

The owner has considered the bid dated _____ submitted by you for the above described work in response to its Advertisement for Bids and its Information for Bidders.

You are hereby notified that your base bid has been accepted in the total amount of _____ dollars and _____ cents (\$).

You are required by the Information for Bidders to execute the Agreement and furnish the required Contractor’s performance bond, payment bond, and certificates of insurance with ten (10) calendar days from the date of this notice to you. If you fail to execute said agreement and to furnish said bonds within ten (10) days from the date of the notice, said Owner will be entitled to consider all your rights arising out of the Owner’s acceptance of you bid abandoned and as a forfeiture of your bid bond. 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 _____, 2019.

Town of Ridgeland

Owner

(Signature)

By: Dennis E. Averkin

(Print Name)

Title: Town Administrator

Acceptance of Notice

Receipt of the above Notice of Award is hereby acknowledged by _____ this the _____ day of _____, 2023.

By: _____

Title: _____

SECTION 00526
NOTICE TO PROCEED

00526-1

TOWN OF RIDGELAND
WATER AND SEWER RESILIENCY IMPROVEMENTS

SAMPLE NOTICE TO PROCEED

TO: (Contractor's name/address)

DATE: _____

PROJECT: 04-79-07454
(Number)

Water and Sewer Resiliency Improvements
(Name)

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

Owner

By: Dennis E. Averkin

Title: Town Administrator

ACCEPTANCE OF NOTICE

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

this the _____ day of _____, 2023.

By: _____

Title: _____

SECTION 00600
PERFORMANCE BOND

00600-1

TOWN OF RIDGELAND
WATER AND SEWER RESILIENCY IMPROVEMENTS

SECTION 00600

PERFORMANCE BOND

BOND NO. _____

KNOW ALL MEN BY THESE PRESENTS that we, _____ as Principal, and _____ as Surety, are held and firmly bound unto the Town of Ridgeland, South Carolina herein after called the Obligee, in the Penal sum of _____ Dollars (\$ _____) for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally firmly by these presents.

WHEREAS, the Principal, on the _____ day of _____, 2023 entered into a certain Contract with the Owner, included herein, for the Contract entitled Town of Ridgeland Water and Sewer Resiliency Improvements, Ridgeland, South Carolina.

NOW THEREFORE, the condition of this obligation is such that if the Principal shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of said Contract, 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 shall be void; otherwise, to remain in full force and effect.

Whenever the Principal shall be and is declared by the Owner to be in default under the Contract, or wherever the contract has been terminated by default of the Contractor, the Owner having performed the Owner's obligations hereunder, the Surety shall:

1. Complete the Contract in accordance with its terms and conditions, or at the Owner's sole option.
2. Obtain a Bid or Bids for submission to the Owner for completing the Contract in accordance with its terms and conditions, and upon determination by the Owner and Surety of the lowest responsible Bidder, arrange for a Contract between such Bidder and the Owner, and made 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 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 the Owner to the Contractor under the Contract and any amendments thereto, less the amount properly paid by the Owner to the Contractor.

No right of action shall accrue on this Bond to or for the use of any person or corporation other than the Owner named herein or the successors or assignees thereof.

In the case of termination of the Contract, as provided in the Construction Contract Documents, there shall be assessed against the Principal and Surety herein, all expenses, including design/engineering, geo-technical, surveying, and legal services incidental to collecting losses to the Owner under this Bond.

This Bond shall remain in full force and effect for such period or periods of time after the date of acceptance of the project by the Owner as are provided for in the Construction Contract Documents, and the Principal hereby guarantees to repair or replace for the said periods all work performed and materials and equipment furnished, which were not performed or furnished according to the terms of the Construction Contract Documents. If no specific periods of warranty are stated in the Construction Contract Documents for any particular item of work, material, or equipment, the Principal hereby guarantees the same for a minimum period of one (1) year from the date of final acceptance by the Owner.

The Surety shall permit arbitration and be ultimately responsible for the payment of any award.

IN WITNESS WHEREOF, the above bounden parties have caused this Bond to be signed and sealed by their appropriate officials as of the _____ day of _____, 2023.

PRINCIPAL

(Firm Name)

By: _____
(Title)

WITNESS

SURETY

(Firm Name)

By: _____
(Title)

WITNESS

END OF SECTION 00600

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SECTION 00601
PAYMENT BOND

00601-1

TOWN OF RIDGELAND
WATER AND SEWER RESILIENCY IMPROVEMENTS

SECTION 00601

PAYMENT AND MATERIAL BOND

BOND NO. _____

KNOW ALL MEN BY THESE PRESENTS that we, _____ as Principal, and _____ as Surety, are held and firmly bound unto the Town of Ridgeland, South Carolina hereinafter called the Obligee, in the Penal sum of _____ Dollars (\$ _____) for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally firmly by these presents.

WHEREAS, the Principal, on the _____ day of _____, 2023 entered into a certain Contract with the Owner, included herein, for Contract entitled Town of Ridgeland Water and Sewer Resiliency Improvements, Ridgeland, South Carolina.

NOW THEREFORE, the condition of this obligation is such that if the Principal shall promptly make payments to all persons supplying labor, materials and supplies used directly or indirectly by said Principal or his Subcontractors in the prosecution of the work provided for in said Contract, then this obligations shall be void; otherwise to remain in full force and effect, subject, however, to the following conditions:

1. This bond is executed for the purpose of complying with the applicable State of South Carolina Statutes and all acts amendatory thereof, and this Bond shall inure to the benefit of any and all persons supplying labor, material and supplies used directly or indirectly by the Principal or his Subcontractors in the prosecution of the work provided for in said Contract so as to give such persons a right of action to recover upon this Bond in a separate suit brought on this Bond. No right of action shall accrue hereunder to or for the use of any person except as such right of action may be given and limited by the applicable State of South Carolina Statutes.
2. In each and every suit brought against the Principal and Surety upon this Bond in which the plaintiff shall be successful, there shall be assessed therein against the Principal and Surety herein, in favor of the Plaintiff therein, reasonable counsel fees, which the Principal and Surety hereby expressly agree to pay as a part of the cost and expense of said suit.
3. A claimant, except a laborer, who is not in privity with the Principal and who has not received payment for his labor, materials, or supplies, shall, within forty-five (45) calendar days after beginning to furnish labor, materials, or supplies for the prosecution of the work, furnish the Principal with a notice that he intends to look to the bond for protection.
4. A claimant who is not in privity with the Principal and who has not received payment for his labor, materials or supplies shall, within ninety (90) calendar days after performance of the labor or after complete delivery of the materials or supplies, deliver to the Principal and to the Surety written notice of the performance of the labor or delivery of the materials or supplies and of the non-payment.

5. No action for the labor, materials, or supplies may be instituted against the Principal or the Surety unless both notices have been given. No action shall be instituted against the Principal or the Surety on the bond after one (1) year from the performance of the labor or completion of delivery of the materials or supplies.

The Surety shall permit arbitration and be ultimately responsible for the payment of any award.

IN WITNESS WHEREOF, the above bounden parties have caused this Bond to be signed and sealed by their appropriate officials as of the _____ day of _____, 2019.

PRINCIPAL

(Firm Name)

By: _____
(Title)

(Witness)

SURETY

(Firm Name)

By: _____
(Title)

(Witness)

END SECTION 00601

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SECTION 00640
PAY REQUEST FORM

00640-1

TOWN OF RIDGELAND
WATER AND SEWER RESILIENCY IMPROVEMENTS

**TOWN OF RIDGELAND
APPLICATION AND CERTIFICATION FOR PAYMENT**

TO OWNER: TOWN OF RIDGELAND
1 TOWN SQUARE
RIDGELAND, SC 29936

APPLICATION NO.:
PERIOD TO:
PROJECT NO.: 04-79-07454

Distribution to:
___ Owner
___ Engineer
___ Contractor

FROM CONTRACTOR: Contractor's Name & Address

CONTRACT FOR: TOWN OF RIDGELAND WATER AND SEWER RESILIENCY IMPROVEMENTS

CONTRACTORS APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.

- 1. ORIGINAL CONTRACT SUM \$ _____
- 2. Net change by Change Orders \$ _____
- 3. CONTRACT SUM TO DATE (LINE 1 + 2) \$ _____
- 4. TOTAL COMPLETED & STORED TO DATE \$ _____
- 5. RETAINAGE:
 - a. _____% of Completed Work \$ _____
 - b. _____% of Stored Material \$ _____
 - Total Retainage (Line 5a + 5b) \$ _____
- 6. TOTAL EARNED LESS RETAINAGE (Line 4 less Line 5 Total) \$ _____
- 7. LESS PREVIOUS CERTIFICATES FOR PAYMENT (Line 6 from prior Certificate) \$ _____
- 8. CURRENT PAYMENT DUE \$ _____
- 9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 3 less Line 6) \$ _____

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner		
Total approved this Month		
TOTALS		
NET CHANGES by Change Order		

The undersigned Contractor certifies that to the best of the Contractors knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:
By: _____ Date: _____
State of: _____
County of: _____
Subscribed and sworn to before me this _____ day of _____

Notary Public:
My Commission expires: _____

ENGINEER'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Engineer certifies to the Owner that to the best of the Engineers Knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED \$ _____
(Attach explanation if amount certified differs from the amount applied for. Initial all figures on this Application and on the Continuation Sheet that are changed to conform to the amount certified.)

ENGINEER:
By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract

Attach a Schedule of Values which includes a description of work completed along with any supporting documentation.

SECTION 00641
CHANGE ORDER FORM

00641-1

TOWN OF RIDGELAND
WATER AND SEWER RESILIENCY IMPROVEMENTS

SECTION 00641

CHANGE ORDER FORM

CHANGE ORDER NO. _____

DATE: _____

CONTRACTOR: _____

OWNER: Town of Ridgeland

AGREEMENT DATE: _____

The following changes are made to the Contract Documents:

Original CONTRACT AMOUNT \$ _____

Current CONTRACT AMOUNT ADJUSTED
by Previous CHANGE ORDER \$ _____

Net (Increase) (Decrease) of CONTRACT AMOUNT
Resulting from this CHANGE ORDER \$ _____

Current CONTRACT AMOUNT Including this CHANGE ORDER \$ _____

ORIGINAL CONTRACT TIME _____ Calendar Days

Current CONTRACT TIME ADJUSTED
by Previous CHANGE ORDER _____ Calendar Days

Net (Increase) (Decrease) Resulting
from this CHANGE ORDER _____ Calendar Days

Current CONTRACT COMPLETION DATE
including this CHANGE ORDER _____

(Change Order No. _____, Page 1 of 3)

CHANGES ORDERED:

I. GENERAL: This CHANGE ORDER is necessary to cover changes in the Work to be performed under the Contract. GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS, SPECIFICATIONS, DRAWINGS and all other CONTRACT DOCUMENTS govern all Work under this CHANGE.

II. REQUIRED CHANGES:

III. JUSTIFICATION:

IV. PAYMENT:

(Change Order No. _____, Page 2 of 3)

00641-2

TOWN OF RIDGELAND
WATER AND SEWER RESILIENCY IMPROVEMENTS

VI. APPROVAL AND CHANGE AUTHORIZATION:

Acknowledgments: The aforementioned change, and work effected thereby, is subject to all provisions of the original contract not specifically changed by the Change Order; and it is expressly understood and agreed that the approval of the Change Order shall have no effect on the original Contract other than matters expressly provided herein.

Change Order Requested by:

RECOMMENDED BY:

Engineer

By: _____
Signature

Date: _____

ACCEPTED BY:

Contractor

By: _____
Signature

Date: _____

APPROVED BY:

Owner

By: _____
Signature and Title

Date: _____

(Change Order No. _____, Page 3 of 3)

00641-3

CERTIFICATION REGARDING LOBBYING LOWER TIER COVERED TRANSACTIONS

Applicants should review the instructions for certification included in the regulations before completing this form. Signature on this form provides for compliance with certification requirements under 15 CFR Part 28, "New Restrictions on Lobbying."

LOBBYING

As required by Section 1352, Title 31 of the U.S. Code, and implemented at 15 CFR Part 28, for persons entering into a grant, cooperative agreement or contract over \$100,000 or a loan or loan guarantee over \$150,000 as defined at 15 CFR Part 28, Sections 28.105 and 28.110, the applicant certifies that to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure occurring on or before October 23, 1996, and of not less than \$11,000 and not more than \$110,000 for each such failure occurring after October 23, 1996.

Statement for Loan Guarantees and Loan Insurance

The undersigned states, to the best of his or her knowledge and belief, that:

In any funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this commitment providing for the United States to insure or guarantee a loan, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

Submission of this statement is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required statement shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure occurring on or before October 23, 1996, and of not less than \$11,000 and not more than \$110,000 for each such failure occurring after October 23, 1996.

As the duly authorized representative of the applicant, I hereby certify that the applicant will comply with the above applicable certification.

NAME OF APPLICANT

AWARD NUMBER AND/OR PROJECT NAME

PRINTED NAME AND TITLE OF AUTHORIZED REPRESENTATIVE

SIGNATURE

DATE

**NOTICE OF REQUIREMENTS FOR AFFIRMATIVE ACTION
TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY
(EXECUTIVE ORDER 11246 AND 41 CFR PART 60-4)**

The following Notice shall be included in, and shall be a part of all solicitations for offers and bids on all Federal and federally assisted construction contracts or subcontracts in excess of \$10,000.

The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.

The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Timetables	Goals for minority participation for each trade	Goals for female participation for each trade
	29.8 %	6.9%

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its federally involved and non federally involved construction.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order, and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the subcontractor; employer identification number of the subcontractor; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed. As used in this Notice, and in the contract resulting from this solicitation, the "covered area" is:

State of	<u>South Carolina</u>
County of	<u>Jasper</u>
City of	<u>Ridgeland</u>

**SECTION 01025
MEASUREMENT AND PAYMENT**

A. GENERAL

1. The CONTRACTOR shall receive and accept the compensation provided in the Proposal and the Contract as full payment for furnishing all materials, labor, tools and equipment, for performing all operations necessary to complete the work under the Contract, and also in full payment for all loss or damages arising from the nature of the work, or from any discrepancy between the actual quantities of work and quantities herein estimated by the Engineer, or from the action of the elements or from any unforeseen difficulties which may be encountered during the prosecution of the work until the final acceptance by the OWNER.
2. The prices stated in the proposal include all costs and expenses for taxes, labor, equipment, materials, commissions, transportation charges and expenses, patent fees and royalties, labor for handling materials during inspection, together with any and all other costs and expenses for performing and completing the work as shown on the Drawings and specified herein. The basis of payment for an item at the unit price shown in the proposal shall be in accordance with the description of that item in this Section.
3. The CONTRACTOR's attention is called to the fact that the quotations for the various items of work are intended to establish a total price for completing the work in its entirety. Should the CONTRACTOR feel that the cost for any item of work has not been established by the Bid Form or Payment Items, he shall include the cost for that work in some other applicable bid item, so that his proposal for the project does reflect his total price for completing the work in its entirety.

B. MEASUREMENT

1. The quantities for payment under this Contract shall be determined by actual measurement of the completed items, in place, ready for service and accepted by the OWNER, in accordance with the applicable method of measurement therefor contained herein. A representative of the CONTRACTOR and OWNER shall witness all field measurements.

C. WORK ITEMS NOT PAID FOR SEPARATELY

1. Color Audio-Video Recording: Measurement for pre-construction color audio-video recording will not be made for payment and all items shall be included in the unit price of project unit items installed.
2. Construction Photographs: Measurement for construction photographs will not be made for payment and all items shall be included in the unit price of project unit items installed.
3. Maintenance of Traffic: Measurement for maintenance of traffic/temporary traffic control will not be made for payment and all items shall be included in the unit price of project items installed.

4. Erosion and Sediment Control: Measurement for erosion and sediment control will not be made for payment and all items shall be included in the unit price of project items installed.
5. Temporary Sewer Bypassing Operations: Measurement for temporary sewer bypassing operations will not be made for payment and all items shall be included in the unit price of project items installed.
6. Restoration: Measurement for restoration requirements (including but not limited to grassing, grading, restoring structures damaged by construction to preconstruction condition) other than pavement items noted in bid form will not be made for payment and all items shall be included in the unit price of project items installed.
7. Contractor Storage Site / Lay Down Yard / Temporary Office: Measurement for Contractor Storage Site / Lay Down Yard / Temporary Office will not be made for payment and all items shall be included in the unit price of project unit items installed.
8. Regular Excavation: Measurement for regular excavation will not be made for payment and all items shall be included in the unit price of project unit items installed.
9. Dewatering: Measurement for dewatering operations necessary for construction will not be made for payment and all items shall be included in the unit price of project unit items installed.
10. Stabilization: Measurement for stabilization operations necessary for construction will not be made for payment and all items shall be included in the unit price of project unit items installed.
11. Miscellaneous Work Items: Measurement for miscellaneous work items such as mobilization / demobilization, payment and performance bonds, testing and reporting, temporary fencing, temporary facilities, as-builts/record drawings, and other items not specifically listed in the Bid Proposal Form will not be made for payment and all items shall be included in the unit price of project unit items installed.
12. Project Sign: Measurement for Project Sign will not be made for payment and all items shall be included in the unit price of project unit items installed.

PAY ITEMS

1. PART I – PUMP STATION IMPROVEMENTS (VARIES)

Measurement and payment for pump station improvements items is lump sum and will be full compensation for furnishing and installing all equipment and facility improvements at the pump station site as defined in the construction drawings and specifications. The requirements of pump station improvements varies by site. Payment shall be full compensation for all labor, tools, materials, and equipment to provide all noted or required demolition and disposal, construction or rehabilitation of manholes and wet wells including modifications to or raising or replacing tops, lining systems, valve vault construction or rehabilitation, pump and accessory replacement, electrical

equipment including but not limited to junction boxes, panels, conduits, generators, automatic transfer switch, fuel tank, and level control systems, all piping construction, modification, or replacement including all piping, valves, restraints, thrust blocks, and fittings, locate wire, water services and hose station and backflow preventer system (unless otherwise noted), wet well wizard systems, flow meter, protective grating and hatch systems, light poles, fencing (temporary and permanent) improvements, concrete slabs, site grading including any necessary fill, site restoration including any necessary 57 stone, visqueen, grassing, erosion and sediment control, maintenance of traffic, and sewer bypass systems, pavement repairs, and all other items necessary to provide a fully operational system. Buoyancy calculations for the wetwell, dewatering plans and calculations, and stabilization calculations shall be prepared and signed/sealed by a professional engineer licensed in South Carolina. Payment will be based on a percentage of work complete.

It is noted that all equipment and labor, materials and tools necessary to furnish and install SCADA components noted in the Part I pump station drawings and specifications shall be included under the Part IV Supervisory Control and Data Acquisition (SCADA) Improvements bid item.

2. PART I – PUMP STATION 3 ACCESS ROAD IMPROVEMENTS

Measurement and payment for Pump Station 3 Access Road Improvements shall be a lump sum item and shall include all labor, materials, equipment and tools for the noted access road improvements, including crushed aggregate, any necessary fill and grading, all necessary demolition and construction of concrete curb and gutter, sidewalk, and driveway approach improvements, all necessary erosion and sediment control, site restoration, and maintenance of traffic from US Hwy 17/N. Jacob Smart Boulevard up to and outside of the Pump Station 3 proposed fencing area. This item shall also include the 2-inch water service installation including the tie-in to the existing 12-inch water main on US Hwy 17 and the water service installation to the Pump Station 3 site including the water service piping, backflow preventer and hose station within the Pump Station 3 site. Payment will be made based on a percentage of work complete.

3. PART I – PUMP STATION 9 ACCESS ROAD IMPROVEMENTS

Measurement and payment for Pump Station 9 Access Road Improvements shall be a lump sum item and shall include all labor, materials, equipment and tools for the noted access road improvements, including crushed aggregate, any necessary fill and grading, all necessary erosion and sediment control, site restoration, and maintenance of traffic from Hwy 278/Grays Highway up to and outside of the Pump Station 9 fencing area. Payment will be made based on a percentage of work complete.

4. PART I – PUMP STATION IMPROVEMENTS – WETWELL INSTALLED BY CAISSON METHOD (VARIES)

Measurement and payment for Pump Station Improvements – Wetwell Installed by Caisson Method shall be lump sum item and shall include all labor, materials, equipment and tools for the components listed in Pay Item 1 - Pump Station Improvements with the modification that the wetwell will be installed by the Caisson method to the dimensions and depth noted on the construction document and with concrete fill/bottom slab including

design calculations and buoyancy calculations signed/sealed by a professional engineer licensed in the State of South Carolina. This item shall include all site changes necessary to accommodate the design intent with the installation by Caisson method. Payment will be made based on a percentage of work complete.

5. PART II – REMOVE AND REPLACE ASPHALT ROADWAY (PER SCDOT APPROVED DETAIL)

Payment will be made on a unit price per square yard basis for all equipment, labor, materials and tools necessary for the removal and replacement of asphalt roadway, in accordance with the Contract Drawings, Details and the SCDOT Encroachment Permit. Flowable fill shall be utilized as backfill in all open cuts in the roadway. All pavement markings shall be restored.

6. PART II – MILL EXISTING ASPHALT ROADWAY AND INSTALL 1-1/2 INCH THICK ASPHALT OVERLAY WITH SCDOT TYPE ASPHALT (RESTRIPE VARIES)

Payment will be made on a unit price per square yard basis for all equipment, labor, material and tools necessary to mill existing asphalt roadway and install 1-1/2 inch thick asphalt overlay with SCDOT type asphalt in accordance with Contract Drawings, Details and the SCDOT Encroachment Permit. Payment shall include all temporary and permanent pavement markings and striping as required per SCDOT, (paint on secondary roads and thermoplastic on primary roads per SCDOT determination).

7. PART II – SEWER LINE CLEANING FOR CONSTRUCTION PREP (JETTING AND DISPOSAL)

Reference Section 02955 Sewer Cleaning and CCTV item 1.5 A for measurement and payment of Sewer Line Cleaning.

8. PART II – SEWER LINE ROOT (TAP) REMOVAL

Reference Section 02955 Sewer Cleaning and CCTV item 1.5 C for measurement and payment for Sewer Line Root Removal

9. PART II – INTRUDING SEWER LATERAL CUTS

Reference Section 02955 Sewer Cleaning and CCTV item 1.5 D for measurement and payment for Lateral Cuts.

10. PART II – PRE-CONSTRUCTION AND POST-CONSTRUCTION CCTV INSPECTION

Reference Section 02955 Sewer Cleaning and CCTV item 1.5 B for measurement and payment for CCTV Inspection.

11. PART II – GRAVITY SEWER REHABILITATION – CIPP (INCLUDES SEWER BYPASSING AND SEWER LATERAL REINSTATEMENT) (VARIES BY SIZE)

Reference Section 02970 Sanitary Sewer CIPP item 1.5 A for measurement and payment for Cured-in-Place-Pipe.

12. PART II – GRAVITY SEWATER REHABILITATION – PIPE BURSTING (INCLUDES SEWER BYPASSING) (VARIES BY SIZE)

Reference Section 02975 Sanitary Sewer Pipe Bursting item 1.6 A for measurement and payment for Pipe Bursting.

13. PART II – SEWER SERVICE LATERAL RECONNECTION (FOR PIPE BURSTING OR PIPE REPLACEMENT)

Reference Section 02975 Sanitary Sewer Pipe Bursting item 1.6 B for measurement and payment for Sewer Lateral Reconnection.

14. PART II – REMOVE AND REPLACE 8” ORANGEBURG SEWER PIPE WITH 8” PVC (SDR26) GRAVITY SEWER PIPE (4’ – 10’ DEPTH) (INCLUDES SEWER BYPASSING)

Payment for removal of 8” orangeburg sewer pipe and replacement with 8” PVC (SDR26) at the depth noted will be made on a linear foot basis for all equipment, materials, labor and tools necessary for the footage of wastewater pipe actually removed/replaced. The unit price set forth in the contract will constitute full compensation for excavation; native soil backfilling; dewatering; sheeting and shoring driven and pulled and drag shields for trenches of all depths; traffic control; as-builts; furnishing, laying, jointing and testing the wastewater piping; removal and disposal of the existing wastewater pipe; stoppers for all ends of pipe and fittings; transition couplings; bypass pumping plus all incidental work necessary for a complete installation and restoration to preconstruction condition (except for pavement restoration which has separate pay item).

15. PART II – GRAVITY SEWER POINT REPAIR (<10’ DEPTH) (INCLUDES SEWER BYPASSING) (VARIES BY SIZE)

Payment for removal of damaged piping to the extents noted on the Contract Drawings and replacement with PVC (SDR26) piping at the depth and size noted will be made on a linear foot basis for all equipment, materials, labor and tools necessary for the footage of wastewater pipe actually removed/replaced. The unit price set forth in the contract will constitute full compensation for excavation; native soil backfilling; dewatering; sheeting and shoring driven and pulled and drag shields for trenches of all depths; traffic control; as-builts; furnishing, laying, jointing and testing the wastewater piping; removal and disposal of the existing wastewater pipe; stoppers for all ends of pipe and fittings; transition couplings; bypass pumping plus all incidental work necessary for a complete installation and restoration to preconstruction condition (except for pavement restoration which has separate pay item)..

16. PART II – NEW 8” PVC (SDR26) GRAVITY SEWER PIPE (0’ – 10’ DEPTH)

Reference Section 02640 Sewer System Construction item 1.5 B. 1 for measurement and payment for Gravity Sewer Pipe.

17. PART II – REMOVE EXISTING 8” GRAVITY SEWER PIPE (0’-6’ DEPTH) AND RESTORE

Payment will be made on a linear foot basis for all equipment, labor, material and tools necessary for the removal of gravity sewer piping below grade. Payment will be compensation in full for removal of grassing; excavating; removal of piping; transporting and disposal of the pipe and appurtenances; traffic control; A-3 soil fill replacement; backfill and compacting as required, and restoration of area to preconstruction conditions (except for pavement restoration which is a separate pay item).

18. PART II – NEW 12” STEEL CASING PIPE AND ACCESSORIES (0’ – 6’ DEPTH)

Payment will be made on a linear foot basis for all equipment, labor, material, and tools necessary for the installation of casing by open cut actually installed. Measurement shall be made along the horizontal projection of the center line of the casing. Payment for the work will be made at the Contract unit price and shall be full compensation for the items of work, complete, including casing pipe; casing spacers or end caps (if required); locate wiring (if require); excavation; dewatering; traffic control; and all incidental work required to complete the work including all materials, labor, tools and equipment.

19. PART II – REMOVE EXISTING MANHOLE AND RESTORE (0’-6’ DEPTH)

Payment will be made on a per each unit price basis for all equipment, labor, material and tools necessary for the removal of existing manhole as specified, and shall include all demolition; A-3 soil fill replacement for voids and unsuitable material; removal of grassing; excavating; backfilling; compacting; sealing any and all pipes leading into and out of the structure; traffic control; transporting and disposal, as required, for complete removal and disposal, and restoration of area to preconstruction conditions (except for pavement restoration which is a separate pay item).

20. PART II – NEW 4’ DIAMETER PRECAST CONCRETE MANHOLE (0’-10’)

Reference Section 02640 Sewer System Construction item 1.5 B. 3 for measurement and payment for Manholes.

21. PART II – REPLACE MANHOLE COVER

Reference Section 02960 Sanitary Sewer Manhole Rehabilitation item 1.7 E for measurement and payment for Manhole Cover Replacement.

22. PART II- INSTALL HDPE MANHOLE INSERT

Reference Section 02960 Sanitary Sewer Manhole Rehabilitation item 1.7 D for measurement and payment for HDPE Manhole Insert.

23. PART II – INSTALL URETHANE RUBBER SEAL ON INTERIOR MANHOLE CHIMNEY/FRAME

Reference Section 02960 Sanitary Sewer Manhole Rehabilitation item 1.7 B for measurement and payment for Manhole Frame and Chimney Seal - Interior.

24. PART II – INSTALL EXTERNAL RUBBER SEAL ON MANHOLE CHIMNEY/FRAME ABOVE GRADE

Reference Section 02960 Sanitary Sewer Manhole Rehabilitation item 1.7 C for measurement and payment for Manhole Frame and Chimney Seal – Exterior Above Grade.

25. PART II – INSTALL CEMENTITIOUS MORTAR LINING IN MANHOLE (4' DIA) (INCLUDES SEWER BYPASSING)

Reference Section 02960 Sanitary Sewer Manhole Rehabilitation item 1.7 A for measurement and payment for Manhole Protective Coating.

26. PART II – REPLACE MANHOLE FRAME AND ADJUST TO ABOVE GRADE

Reference Section 02960 Sanitary Sewer Manhole Rehabilitation item 1.7 F for measurement and payment for Manhole Frame and Cover Replacement and Adjustment, At or Above Grade.

27. PART II – REPLACE MANHOLE FRAME AND ADJUST TO GRADE (INCLUDING NECESSARY ASPHALT/BRICK/CONCRETE RESTORATION)

Reference Section 02960 Sanitary Sewer Manhole Rehabilitation item 1.7 F for measurement and payment for Manhole Frame and Cover Replacement and Adjustment, At or Above Grade.

28. PART II – 6" PVC INSIDE DROP FOR FORCEMAIN

Payment will be made on a per each unit cost basis for all equipment, labor, material and tools necessary for the installation of 6" PVC inside forcemain drop in existing manhole in accordance with construction drawings and specifications. Payment for the work will be at the Contract unit price shown for the respective item and shall be full compensation for the item of work completed, including removal of existing forcemain piping and fittings in manhole, installation of new fittings, forcemain piping and supports for new inside drop in manhole, all required removal of grassing; silt fence, excavation; dewatering; native soil backfilling; jointing pipe; all sheeting, shoring, and bracing required to maintain excavations in a safe condition; protecting existing structures, utilities and property both public and private; traffic control; cleaning up the site; installing silt fence and other erosion, sedimentation protection and control devices; restoration to preconstruction condition (except for pavement restoration which has a separate pay item) and all incidental and related work required to complete the work of the item.

29. PART II – 12" PVC (DR18) WATER MAIN

Payment will be made on a linear foot basis for all equipment, labor, material, and tools necessary for the installation of 12" PVC (DR18) Water Main. Measurement shall be made along the horizontal projection of the center line of pipe. No deduction in length will be made for the space occupied by valves or fittings. Payment for the work will be at the Contract unit price shown for the respective item and shall be full compensation for the item of work completed, including all required removal of grassing; silt fence,

excavation; de-watering; native soil backfilling; laying and jointing pipe; pressure and leakage testing; flushing and disinfecting; de-chlorination (if required); all sheeting, shoring, and bracing required to maintain excavations in a safe condition; protecting existing structures, utilities and property both public and private; traffic control; cleaning up the site; installing silt fence and other erosion, sedimentation protection and control devices; furnishing and installing locate wiring, locate wire test stations, locate wire-related appurtenances and locate wire testing; furnishing all material, labor, tools, and equipment; as-builts; and all incidental and related work required to complete the work of the item.

30. PART II – ABANDON 12” WATER MAIN BY GROUT FILL

Payment will be made on a linear foot basis for all equipment, labor, material and tools necessary for excavating and grout filling abandoned mains Payment will be compensation in full for removal of grassing; excavating as required; grout; grout filling; backfilling and compacting; traffic control, for a complete abandonment and restoration other than pavement.

31. PART II – 12” MJ DI FITTINGS (VARIOUS)

Payment will be made on a per each unit basis for all equipment, labor, material and tools necessary for fittings furnished and installed. Payment for the work will be made at the Contract unit price and shall be full compensation for the items of work including furnishing and installing fittings and mechanical restraints at fitting joints, complete with all necessary incidental work required to complete the work and all materials, labor, tools and equipment.

32. PART II – A-3 FILL

Reference Section 02640 Sewer System Construction item 1.5 B. 5 for measurement and payment for Sand Bedding and Backfill.

33. PART II – STONE BEDDING

Reference Section 02640 Sewer System Construction item 1.5 B. 4 for measurement and payment for Sand Bedding and Backfill.

34. PART III – WELL SITE #2 BUILDING IMPROVEMENTS

Measurement and payment for Well Site #2 Building Improvements item is lump sum and will be full compensation for constructing proposed modifications to the Well Site #2 building as defined in the construction drawings and specifications. Payment shall be full compensation for all labor, tools, materials, and equipment to provide all noted or required demolition and disposal, building expansion, modifications and roof improvements, exhaust/fan systems, painting, new doors, concrete foundations and stoops, painting and all other construction necessary for complete building expansion in accordance with the architectural and structural drawings. Payment will be based on a percentage of work complete.

35. PART III – WELL SITE #2 ELECTRICAL IMPROVEMENTS

Measurement and payment for Well Site #2 Electrical Improvements item is lump sum and will be full compensation for constructing proposed electrical modifications as defined in the construction drawings and specifications. Payment will be full compensation for all labor, tools, materials and equipment to provide all noted or required demolition and disposal of electrical components, furnish and install electrical equipment including but not limited to panels, conduits, generator, automatic transfer switch, fuel tank, concrete slabs for generator and fuel tank, lighting, site restoration to preconstruction condition, grassing, erosion and sediment control, maintenance of traffic, and all other items necessary to provide a fully operational system in accordance with the electrical construction drawings and specifications. Payment will be based on a percentage of work complete.

It is noted that all equipment and labor, materials and tools necessary to furnish and install SCADA components noted in the Part III Well Site #2 Improvements construction drawings and specifications shall be included under the Part IV Supervisory Control and Data Acquisition (SCADA) Improvements bid item.

36. PART III – WELL SITE #2 ALL OTHER REQUIRED IMPROVEMENTS

Measurement and payment for Well Site #2 All Other Required Improvements is lump sum and will be full compensation for constructing all other proposed demolition and construction at Well Site #2, in accordance with the Part III construction drawings and specifications which are not included in pay items 34 and 35. Payment will be full compensation for all labor, tools, materials and equipment to provide the remaining improvements at the Well Site #2 primarily comprising chemical treatment systems improvements, piping hydroblast and painting, and any other miscellaneous proposed improvements and modifications. Payment will be based on a percentage of work complete.

37. PART IV – SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA) IMPROVEMENTS

Measurement and payment for Supervisory Control and Data Acquisition (SCADA) Improvements item is lump sum and will be full compensation for furnishing and installing all equipment and facility improvements required for the satisfactory installation and operation of the proposed water and sewer SCADA system upgrade including all electrical installation and connections and system integration.

Payment shall be full compensation for all labor, tools, materials, and equipment to provide all noted or required demolition, construction or modifications at the 16 pump station sites, three (3) well sites, five (5) elevated storage tank sites, and at the Jimmy Mixson WRF. Any SCADA improvements noted in Parts I: Pump Station Improvements and Part III: Well Site #2 Improvements shall be included in this Part IV pay item. All equipment shall be new and shall be provided in accordance with the Division 16 specifications.

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SECTION 01100

SUMMARY OF WORK

PART 1-GENERAL

The Summary of Work in this Section comprises the Town of Ridgeland Water and Sewer Resiliency Improvements, Ridgeland, South Carolina. The following scope of work description is intended to be general in nature. The intention is to have the successful Contractor perform all of the work included and presented within the Construction Contract Documents, paying particular attention to the Schedule of Bid Prices. The Contractor shall comply with and be responsible for all of the requirements of the Project Manual including the Drawings and Specifications.

1.01 RELATED REQUIREMENTS INCLUDED

Project Manual, Division 0, Bidding and Contract Documents

The Contractor shall comply with and be responsible for all of the requirements of the Project Manual, without exception.

The Contract Form for this Project shall be as stipulated in Division 0, Section 00500 in the Project Manual.

1.02 SCOPE OF WORK

A. Construction of water and sewer system resiliency improvements including upgrade of existing pump systems at Pump Stations #3, 4, 5, 6, 8, 9, and 12, Well Site #2 upgrades, rehabilitation within three sewer basins: WRF, PS3 and PS4 Sewer Basins, and improvements to the Supervisory Control and Data Acquisition (SCADA) System.. Specific recommended improvements are as follows:

1. Part I - Pump Station Improvements:

- Pump Station 3 (PS3) 11306 North Jacob Smart Boulevard: A complete replacement of the existing pump station with new wet well, valve vault, influent gravity sewer system, duplex 57.5 Hp pumps and associated equipment and piping, wet well wizard, discharge bypass connection, a generator, transfer switch, SCADA upgrades, WRF forcemain reroute, new 2" water service from US17, and site and access road improvements.
- Pump Station 4 (PS4) 123 James Taylor Drive: A complete replacement of the existing pump station with new wet well, valve vault, influent gravity sewer system, duplex 24.8 Hp pumps and associated equipment and piping, wet well wizard, discharge bypass connection, a generator, transfer switch, SCADA upgrades, electrical and site improvements.
- Pump Station 5 (PS5) 1514 Grays Highway: Rehabilitation of the pump station to include new duplex 2.4 Hp grinder pumps, guide rails and associated equipment and piping in wet well and valve vault, wet well wizard, bypass discharge connection system, a new control panel with junction boxes and conduit seals, a generator, transfer switch, electrical improvements, SCADA upgrades, fence expansion, and other facility improvements.
- Pump Station 6 (PS6) 135 Correctional Road: Rehabilitation of the pump station to include coating of the wet well, new duplex 20.1 Hp pumps and guide rails, piping and valves in

wet well and valve vault, wet well wizard, flow meter, discharge bypass connection, a new control panel with junction boxes and conduit seals, SCADA upgrades, raised wet well and reconfiguration of electrical conduit through wet well wall, generator and other electrical improvements and site improvements.

- Pump Station 8 (PS8) 4399 Grays Highway: Rehabilitation of the pump station to include coating of the wet well, new pump discharge piping in the wet well; new piping and valves in valve vault and wet well vent, wet well wizard, new ductile iron discharge bypass connection, a new control panel with junction boxes and conduit seals, fence relocation for proper panel clearance, and new generator and transfer switch, electrical and SCADA upgrades.
- Pump Station 9 (PS9) 2070 Grays Highway: Rehabilitation of the pump station is to include coating of the wet well, new pump discharge piping in the wet well; new piping and valves in the valve vault, new aboveground ductile iron discharge bypass connection and wet well vent, wet well wizard, a new control panel with junction boxes and conduit seals, SCADA upgrades, site improvements to raise elevation, raise wet well and valve vault top slabs, raising of influent manhole top elevation, electrical improvements, site and access road improvements.
- Pump Station 12 (PS12) 12308 North Jacob Smart Boulevard: Rehabilitation of the pump station is to include coating of the wet well, new duplex 2.68 Hp pumps and guide rails, new discharge piping in the wet well; new piping and valves in the valve vault, new wet well vent, a new control panel with junction boxes and conduit seals, wet well wizard, a new abovegrade discharge bypass connection, new raised wet well and valve vault top slabs, SCADA upgrades, new generator and electrical improvements, and site grading and improvements.

2. Part II: Gravity Sewer Rehabilitation:

Gravity sewer pipe rehabilitation by Cured-In-Place-Pipe (CIPP), Pipe Bursting, or Open Cut methods, rehabilitation of 57 existing manholes with a varying combination of cementitious mortar interior lining, urethane rubber sealing system for manhole chimney, HDPE manhole inserts, new manhole covers, new manhole frame, adjustment to or above grade, and/or external rubber seal on manhole chimney and frame. Construction also includes pre-construction sewer pipe cleaning, pre- and post-construction CCTV, all necessary sewer system bypassing operations, sewer lateral restoration, 4 new manholes, removal of 1 manhole, rerouting of an existing water main from a sewer conflict manhole, maintenance of traffic, soil erosion and sediment control, and restoration including pavement repair and overlay to SCDOT standards (all roads are SCDOT).

Sewer Basin Improvements:

- PS3 Sewer Basin (Area A in Drawings)
 - ~1795 LF pipeburst 10-inch to 12-inch gravity sewer
 - ~925 LF pipeburst 8-inch to 10-inch gravity sewer
 - 13 manholes rehabilitation.
- WRF Sewer Basin (Area B in Drawings)
 - ~350 LF – Remove 8-inch Orangeburg and replace with 8-inch PVC gravity sewer
 - ~105 LF – Remove 8-inch VCP gravity sewer
 - ~5400 LF CIPP 8-inch gravity sewer
 - ~260 LF CIPP 10-inch gravity sewer
 - ~185 LF install new 8-inch PVC gravity sewer

- ~70 LF install new 12-inch steel casing by open cut
 - ~110 LF point repair of 8-inch gravity sewer
 - 26 manholes rehabilitation
 - 4 new precast manholes
 - 1 manhole removal
 - Reroute ~50 LF 8-inch water main from sewer conflict manhole.
 - PS4 Sewer Basin (Area C in Drawings)
 - ~20 LF CIPP 10-inch gravity sewer
 - ~2650 LF Clean and Flush gravity sewer only
 - 18 manholes rehabilitation.
3. Part III: Well Site 2 Improvements:
- Building footprint expansion and new roof system
 - Building and piping paints and coatings
 - Building doors replacement
 - New chlorination chemical feed system
 - New phosphate chemical feed system
 - Electrical service upgrade
 - New Emergency generator and automatic transfer switch
 - New control panel components – starters and controls
 - Other electrical improvements
 - SCADA upgrades

4. Part IV: Supervisory Control and Data Acquisition (SCADA System):

The proposed SCADA system improvements for the Town’s water and sewer facilities will need to be compatible and unified with the Jimmy Mixson WRF SCADA system. SCADA upgrades will be provided at the Town’s water and sewer facilities including 16 pump stations, three well sites, and five elevated storage tanks.

5. All mobilization and demobilization, restoration, maintenance of traffic, soil erosion and sediment control, and other work implied necessary to complete an operable sewer system rehabilitation.

1.03 SUBSTANTIAL COMPLETION

Substantial completion is the time at which the Work has progressed to the point where, in the opinion of the Engineer, the Work is sufficiently complete in accordance with the Contract Documents so that the facilities can be utilized for the purposes for which they are intended. For this project, Substantial Completion includes all components of the Work of the Project that rehabilitates and restores to service the sewer collection system, which has been inspected and approved by the Town and determined to be functioning properly. This requires the contractor to achieve completion of all Work of the Project less the paving and establishment of final grassing. This is grass planted but not yet established.

1.04 FINAL COMPLETION

Final completion is the time, as certified by the Engineer, when all Work of the Project is complete, post completion documents have been submitted by the contractor and are satisfactory, and the Project is ready for final payment. Final completion requires the contractor to be at the level of

functionality defined complete with all “punch list” items addressed, grassing to have been established and to be complete in all respects as contained within the Construction Contract Documents. The date of final completion shall constitute the date of the beginning of the Guarantee and Warranty period.

1.05 USE OF THE PREMISES

- A. Contractor shall have use of the area encompassing the Project Site as shown on the applicable drawings for execution of the Work of this Contract, except as may be otherwise indicated or necessitated by the requirements of the Project Manual, or as may be determined by the Owner.
- B. Contractor shall provide, or cause to be provided, and shall pay for all geotechnical services, testing, labor, equipment, materials and such other utilities, transportation and facilities necessary for the proper execution of the Work, whether temporary or permanent, and whether or not incorporated or to be incorporated in the Work.
- C. Contractor shall provide protection at all affected areas of the site during the performance of the Work.
- D. Contractor shall perform all work in conformance with O.S.H.A. requirements, which will be strictly enforced.
- E. Contractor shall coordinate the use of the premises consistent with the Project requirements as may be directed by the Owner.
- F. Contractor shall use access routes for delivery of materials and equipment only as indicated on the drawings approved by the Owner and as may be directed by the Owner. Do not use access routes other than those indicated. Contractor shall keep clean, maintain and repair all access routes used.
- G. Contractor shall assume full responsibility for the protection and safekeeping of all products under this contract, stored and / or installed on the Project Site as well as those products stored off the Project Site. Materials, products and equipment shall be stored on the Project Site only in those areas indicated or allowed for staging and approved by the Owner.
- H. Safe staging and material storage shall be limited to the area indicated on the drawings, which have been approved by the Owner and as may be designated by the Owner. Contractor must obtain specific permission from the Owner for the use of other areas for storage and staging.
- I. Contractor shall protect existing sidewalks, pavement, curbs, utilities, building exterior and interior surfaces subject to damage by Work performed under this contract. Contractor shall, at his sole cost and expense, repair or replace any existing work damaged by his/her prime and/or sub-contractor’s personnel or equipment.

1.06 WORK SEQUENCE AND COMPLETION

- A. Contractor shall work in an orderly manner coordinated with the work of other disciplines and trades.
- B. No disruption to, or use of adjacent facilities and access to those facilities will be allowed.
- C. Operation of the existing sewer system must be maintained at all times during the construction without obstruction of the flow. Any sewer system overflows caused by the contractor or sub-contractors’ actions shall be reported immediately to the Town and Engineer and shall be properly removed and the site cleaned up in accordance with all SCDHEC requirements. Every effort shall be made to keep any overflows from reaching the storm sewer system or any surface waters. The cost of any sewer system overflows, cleanup and monitoring, or fines by SCDHEC shall be paid by the contractor at no expense to the Town.

- D. The Owner may require certain work to be performed after normal working hours or on holidays or weekends or as may be necessitated in the Public interest. Such work does not constitute a change of scope or additional cost.

1.07 LIQUIDATED DAMAGES

The Contractor agrees to commence Work under this Contract on the effective date established as “Notice to Proceed”, and to complete the Work in conformance with the allotted time described in the Project Manual. Should the Contractor neglect, fail or refuse to complete the Work within the established Completion date then the Contractor shall pay to the Owner Liquidated Damages in the amount of Five hundred (\$500.00) per day for those damages suffered by the Owner as a result of delay for each and every calendar day that the Contractor has failed to complete the work within the established Completion date. The aforementioned Liquidated Damages are not a penalty, but rather are a pre-agreed liquidation of the losses incurred by the Owner due to failure of the Contractor to complete the Work on time.

1.08 SUBSTITUTIONS AND PRODUCT OPTIONS

Written requests for substitutions shall be forwarded to the Engineer for review and Owner approval.

1.09 SURVEY

Contractor shall verify all survey data, geotechnical reports and investigations included within the Contract Documents and report any errors and inconsistencies in writing to the Owner before any work is performed in those areas where errors and inconsistencies may exist. Refer to Division 1, Section 01310, Project Management and Coordination in the Project Manual.

PART 2- PRODUCTS

Not Used

PART 3- EXECUTION

Not Used

END OF SECTION 01100

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SECTION 01300

REGULATORY REQUIREMENTS

PART 1 – GENERAL

1.01 RELATED REQUIREMENTS

- A. Division 0, Bidding and Contract Documents of the Project Manual
- B. Division 1, General Requirements of the Project Manual

1.02 CODES, AUTHORITIES, REGULATORY AGENCIES, AND INDUSTRY REFERENCES

- A. Where references are made on the Drawings or in the Technical Specifications to codes, they shall be considered an integral part of the Construction Contract Documents as minimum standards. Nothing contained in the Construction Contract Documents shall be so construed as to be in conflict with any law, bylaw, ordinance or regulation of the municipal, state, federal or other authorities having jurisdiction. The Contractor shall reflect reference to specific codes, as may be applicable, insuring conformance with code requirements.
- B. Perform Work in compliance with the following code:

Current edition of all applicable building code(s), local, state and federal.
International Building Code – latest edition
- C. Perform Work in compliance with the following Authorities and Regulatory Agencies:
 - 1. Town of Ridgeland, South Carolina
 - 2. South Carolina Department of Health Environmental Controls (SCDHEC / OCRM)
 - 3. South Carolina Department of Transportation (SCDOT)
 - 4. OSHA Code of Federal Regulations. (OSHA)
 - 5. All federal, state and local clean air, clean water, water rights, resource recovery, and solid waste disposal standards and the Federal Endangered Species Act, and the Occupational Safety and Health Acts.
 - 6. Environmental Protection Agency (EPA).

1.04 PERMITTING

- A. At no additional expense to the Owner, the Contractor shall file for and obtain necessary licenses and permits for any interim phases for construction, and be responsible for complying with any federal, state, county, and municipal laws, codes, regulations and ordinances applicable to the performance of the Work, including, but not limited to, any laws or regulations requiring the use of licensed prime and /or subcontractors to perform parts of the Work.

- B. Town has acquired (or is acquiring) the following permits for the project work. All other permits are the responsibility of the contractor.
 - 1. SCDOT Enroachment Permit for proposed work under Part I: Pump Station Improvements and Part II: Sewer Rehabilitation
 - 2. SCDHEC Construction Permit for Wastewater Facilities for modifications to the sewer system under Part I: Pump Station Improvements
 - 3. SCDHEC Construction Permit for Water Facilities for improvements at the Well Site 2

1.05 INSPECTION AND CERTIFICATIONS

- A. Arrange inspection and obtain Certificates of approval from applicable authorities having jurisdiction. Furnish Certificates of Approval in accordance with the applicable Technical Specifications and the General Requirements of the Contract.
- B. Notify and coordinate for all appropriate county and state inspections of the work. Allow enough time to maintain progress of the work.

1.06 PERFORMANCE

- A. Should the Contractor knowingly perform any Work that does not conform with the requirements of applicable codes, ordinances, regulations, or standards, without given prior written notice to the Owner and obtaining required variance, etc. from the governing body, Contractor shall assume full responsibility thereof and shall bear all costs involved in correcting such non-complying Work. Costs shall include but not be limited to: All fines, inspection costs, damages, design and management fees in addition to the cost of removal and replacement of the work of all trades involved.

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

Not Used.

END OF SECTION 01300

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**SECTION 01310
PROJECT MANAGEMENT AND COORDINATION**

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall comply with and be responsible for all of the requirements of the Project Manual and the Construction Contract Documents, without exception.
- B. Contractor shall be responsible for general project coordination of all construction phases and aspects, trades and disciplines of the Work of the Project.
- C. Contractor shall be responsible for general coordination of all construction site operations and with other improvement projects that may be conducted by the Owner.
- D. Contractor shall be responsible for general coordination with other interested parties including, but not limited to SCDHEC, OCRM, SCDOT, Owner, other Contractors working on abutter property projects, and all involved permitting authorities.

1.02 RELATED REQUIREMENTS

- A. Division 0, Bidding and Contract Documents in the Project Manual.
- B. Division 1, General Requirements in the Project Manual

1.03 GENERAL COORDINATION

- A. Coordinate scheduling, submittals, and work of various Sections of the Technical Specifications to assure efficient and orderly sequence of installation of construction elements with provisions for accommodating any items furnished by the Owner, or others, to be installed by the Contractor.
- B. Coordinate sequence of Work to accommodate partial occupancy for the Owner as specified in Section 01100, Summary of Work and / or as directed by the Owner.
- C. Review and coordinate requirements of all Divisions of the Project Manual and Sections of the Technical Specifications. Report any discrepancies to the Owner
- D. Maintain services of prime and major sub-contractors throughout duration of the Contract, except as may be required by provisions of Conditions of Contract. Notify the Owner, in writing, of intention to replace prime or sub-contractor(s), outlying reasons for the action and naming proposed replacement contractor(s).
- E. Coordinate work of prime and sub-contractors and record contractor installation(s) data on Project Record (As Constructed) Drawings.

- F. All communications regarding Contract requirements shall be addressed to the Owner. Outline any special procedures required for coordination and include such items as required notices, reports and attendance at meetings.
- G. Arbitrate and resolve coordination conflicts between prime and sub-contractors to ensure complete and operational systems.
- H. Coordinate work with all existing utility systems.
- I. Coordinate construction activities to ensure that operations are carried out with due consideration given to energy, water and materials.
- J. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work. Salvage material shall include marketable deciduous and coniferous timber to be cut and removed by the Contractor on the project site.

1.04 COORDINATION MEETINGS

- A. In addition to the meetings referred to in Section 01315, Progress Meetings, the Contractor shall conduct coordination meetings and pre-installation meetings with supervisory personnel, prime and sub-contractors, suppliers, the Owner and others as necessary and applicable, to assure coordination of different trades and disciplines
- B. Schedule coordination and pre-installation meetings with prime and sub-contractors, suppliers and the Owner to discuss hardware installation and specialty systems installation.

1.05 COORDINATION OF SUBMITTALS

- A. Coordinate use of Project space and sequence of installation of equipment, walks, parking areas, mechanical, electrical, plumbing, or other Work that is indicated diagrammatically on the Contract drawings and/or contained in the Technical Specifications. Utilize space efficiently to maximize accessibility for Owner installations, maintenance and repairs.
- B. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in sequence required to obtain best results.
- C. Make adequate provisions to accommodate items scheduled for later installation, including accepted Bid Alternates, Owner supplied items, sub-subcontractor installed items, work by others, and installation of products purchased with allowances.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used.

END OF SECTION 01310

**SECTION 01315
PROGRESS MEETINGS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Division 1, General Requirements of the Contract Documents apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for project meetings including but not limited to:
 - 1. Construction Progress Meetings.

1.3 PROGRESS MEETINGS

- A. Conduct bi-weekly construction progress meetings at the Project site at regularly scheduled intervals. Notify the Owner of scheduled meeting dates. Coordinate dates of meetings with preparation of the payment request.
- B. Agenda: Review and correct or approve minutes of the previous Construction progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate in the current status of the Project.
 - 1. Contractor's construction schedule: Provide overall construction schedule and two-week look ahead schedule. Review progress since the last meeting. Determine where each activity is in relation to the Contractor's schedule, whether on time or ahead or behind schedule. Determine how schedule can be improved if behind.
- C. Reporting: After each progress meeting date, the Contractor will distribute copies of minutes of the meeting to each party present and to other parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.
 - 1. Schedule Updating: Revise the construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue the revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

(Not Applicable)

END OF SECTION 01315

01315-1

TOWN OF RIDGELAND
WATER AND SEWER RESILIENCY IMPROVEMENTS

SECTION 01340
SHOP DRAWINGS, WORKING DRAWINGS, AND SAMPLES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. The Contractor shall submit to the Engineer for review and approval, such Working Drawings, Shop Drawings, Test Reports and Data on materials and equipment (hereinafter in this Section called Data), and material samples (hereinafter in this Section called Samples) as are required for the proper control of work, including but not limited to those Working Drawings, Shop Drawings, Data and Samples for materials and equipment specified elsewhere in the Specifications and in the Contract Drawings.
2. Within fourteen (14) calendar days after the Effective Date of the Agreement, the Contractor shall submit to the Engineer a complete list of preliminary Data on items for which Shop Drawings are to be submitted. Included in this list shall be the names of all proposed manufacturers furnishing specified items. Review of this list by the Engineer shall in no way expressed or implied relieve the Contractor from submitting complete Shop Drawings and providing materials, equipment, etc., fully in accordance with the Specifications. This procedure is required in order to expedite final review of Shop Drawings.
3. The construction procedures shall comply this Project Manual and with the latest edition of the Town of Ridgeland Water and Sewer Standards.
4. The Contractor is to maintain an accurate updated submittal log and will bring this log to each scheduled progress meeting with the Owner and the Engineer. This log should include the following items:
 - a. Submittal-Description and Number assigned.
 - b. Date to Engineer.
 - c. Date returned to Contractor (from Engineer).
 - d. Status of Submittal (Approved as Noted, Rejected/Resubmit).
 - e. Date of Resubmittal and Return (as applicable).
 - f. Date material release (for fabrication).
 - g. Projected date of fabrication.
 - h. Projected date of delivery to site.
 - i. Status of O&M manuals submittal.

- j. Specification Section.
- k. Drawing Sheet Numbers.

1.02 CONTRACTOR'S RESPONSIBILITY

- A. It is the duty of the Contractor to check all drawings, Data and Samples prepared by or for him before submitting them to the Engineer for review. Each and every copy of the Drawings and Data shall bear the Contractor's stamp showing that they have been so checked. Shop Drawings submitted to the Engineer without the Contractor's stamp will be returned to the Contractor for conformance with this requirement. Shop Drawings shall indicate any deviations in the submittal from requirements of the Contract Documents. If the Contractor takes exception to the specifications, the Contractor shall note the exception in the letter of transmittal to the Engineer.
- B. Determine and verify:
 - 1. Field measurements.
 - 2. Field construction criteria.
 - 3. Catalog numbers and similar Data.
 - 4. Conformance with Specifications.
- C. The Contractor shall furnish the Engineer a schedule of Shop Drawings submittals fixing the respective dates for the submission of Shop and Working Drawings, the beginning of manufacture, testing and installation of materials, supplies and equipment. This schedule shall indicate those that are critical to the progress schedule.
- D. The Contractor shall not begin any of the work covered by a Shop Drawing, Data, or a Sample returned for correction until a revision or correction thereof has been reviewed and returned to him, by the Engineer, with approval.
- E. The Contractor shall submit to the Engineer all drawings and schedules sufficiently in advance of construction requirements to provide no less than thirty (30) calendar days for checking and appropriate action from the time the Engineer receives them.
- F. All submittals shall be accompanied with a transmittal letter containing the following information:
 - 1. Date.
 - 2. Project Title and Number.
 - 3. Contractor's name, address, phone and fax numbers.
 - 4. The number of each Shop Drawing, Project Data, and Sample submitted.

5. Notification of Deviations from Contract Documents.
 6. Submittal Log Number conforming to Specification Log Number.
- G. The Contractor shall submit Shop Drawings in electronic pdf format with the file name indicating the submittal and submittal date to the engineer via email. The Engineer will review and make comments electronically to the contractor and require updated shop drawings electronically until approved.
- Upon engineer's request, the contractor shall submit four (4) copies of descriptive or product Data submittals to complement Shop Drawings for the Engineer plus the number of copies which the Contractor requires returned. The Engineer will retain four (4) sets. All blueprint Shop Drawings shall be submitted with four (4) sets of prints plus the number of copies which the Contractor requires returned. The Engineer will review the blueprints and retain four (4) sets, returning the remainder to the Contractor with appropriate review comments.
- H. The Contractor shall be responsible for and bear all costs of damages which may result from the ordering of any material or from proceeding with any part of work prior to the completion of the review and approval by the Engineer of the necessary Shop Drawings.
- I. The Contractor shall be fully responsible for observing the need for and making any changes in the arrangement of piping, connections, wiring, manner of installation, etc., which may be required by the materials/equipment he proposed to supply both as pertains to his own work and any work affected under other parts, headings, or divisions of drawings and specifications.

1.03 ENGINEER'S REVIEW OF SHOP DRAWINGS

- A. The Engineer's review of Shop Drawings, Data and Samples submitted by the Contractor will cover only general conformity to the Specifications, external connections, and dimensions which affect the installation. The Engineer's review and exceptions, if any, will not constitute an approval of dimensions, quantities, and details of the material, equipment, device, or item shown.
- B. The review of drawings and schedules will be general, and shall not be construed:
1. As permitting any departure from the Contract requirements.
 2. As relieving the Contractor of responsibility for any errors, including details, dimensions, and materials.
 3. As approving departures from details furnished by the Engineer, except as otherwise provided herein.
- C. If the drawings or schedules as submitted describe variations per Paragraph 1.02A. herein, and show a departure from the Contract requirements which the Engineer finds to be in the interest of the Owner and to be so minor as not to involve a change in Contract

Price or time for performance, the Engineer may return the reviewed drawings without noting an exception.

- D. When reviewed by the Engineer, each of the Shop Drawings will be identified as having received such review being so stamped and dated. Shop Drawings stamped "REVISE AND RESUBMIT" and with required corrections shown will be returned to the Contractor for correction and resubmittal.
- E. Resubmittals will be handled in the same manner as first submittals. On resubmittals the Contractor shall direct specific attention, in writing or on resubmittal Shop Drawings, to revisions other than the corrections requested by the Engineer on previous submissions. The Contractor shall make any corrections required by the Engineer.
- F. If the Contractor considers any correction indicated on the drawings to constitute a change to the Contract Drawings or Specifications, the Contractor shall give written notice thereof to the Engineer.
- G. Shop Drawings and submittal Data shall be reviewed by the Engineer for each original submittal and first and second resubmittal; thereafter review time for subsequent resubmittals shall be charged to the Contractor in accordance with the terms of the Engineer's Agreement with the Owner.
- H. When the Shop Drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.
- I. No partial submittals will be reviewed. Submittals not complete will be returned to the Contractor for resubmittal. Unless otherwise specifically permitted by the Engineer, make all submittals in groups containing all associated items for:
 - 1. Systems.
 - 2. Processes.
 - 3. As indicated in specific Specifications Sections.

All drawings, schematics, manufacturer's product Data, certifications and other Shop Drawing submittals required by a system specification shall be submitted at one time as a package to facilitate interface checking.

- J. The shop drawings shall be approved by the Engineer prior to contractor ordering the construction materials.

1.04 SHOP DRAWINGS

- A. When used in the Contract Documents, the term "Shop Drawings" shall be considered to mean Contractor's plans for materials and equipment which become an integral part of the project. These drawings shall be complete and detailed. Shop Drawings shall consist of fabrication, erection and setting drawings and schedule drawings, manufacturer's scale drawings, and wiring and control diagrams. Cuts, catalogs, pamphlets, descriptive

literature, and performance and test data, shall be considered only as supportive to required Shop Drawings as defined above. As used herein, the term "manufactured" applies to standard units usually mass-produced; and "fabricated" means items specifically assembled or made out of selected materials to meet individual design requirements.

- B. Manufacturer's catalog sheets, brochures, diagrams, illustrations and other standard descriptive data shall be clearly marked to identify pertinent materials, product or models. Delete information which is not applicable to the Work by striking or cross-hatching.
- C. Drawings and schedules shall be checked and coordinated with the work of all trades involved, before they are submitted for review by the Engineer and shall bear the Contractor's stamp of approval as evidence of such checking and coordination. Drawings or schedules submitted without this stamp of approval shall be returned to the Contractor for resubmission.
- D. Each Shop Drawing shall have a blank area 3-1/2 inches by 3-1/2 inches, located adjacent to the title block. The title block shall display the following:
 - 1. Project Title and Number.
 - 2. Name of project building or structure.
 - 3. Number and title of the Shop Drawing.
 - 4. Date of Shop Drawing or revision.
 - 5. Name of contractor and subcontractor submitting drawing.
 - 6. Supplier/manufacturer.
 - 7. Separate detailer when pertinent.
 - 8. Specification title and number.
 - 9. Specification section.
 - 10. Application Contract Drawing Number.
- E. If Shop Drawings show variations from Contract requirements because of standard shop practice or for other reasons, the Contractor shall describe such variations in his letter of transmittal. If acceptable, proper adjustment in the Contract shall be implemented where appropriate. If the Contractor fails to describe such variations, he shall not be relieved of the responsibility for executing the work in accordance with the Contract, even though such drawings have been reviewed.
- F. Data on materials and equipment include, without limitation, materials and equipment lists, catalog data sheets, cuts, performance curves, diagrams, materials of construction and similar descriptive material. Materials and equipment lists shall give, for each item

thereon, the name and location of the supplier or manufacturer, trade name, catalog reference, size, finish and all other pertinent Data.

- G. For all mechanical and electrical equipment furnished, the Contractor shall provide a list including the equipment name, and address and telephone number of the manufacturer's representative and service company so that service and/or spare parts can be readily obtained.
- H. Only the Engineer will utilize the color "red" in marking Shop Drawing submittals.

1.05 WORKING DRAWINGS

- A. When used in the Contract Documents, the term "Working Drawings" shall be considered to mean the Contractor's plan for temporary structures such as temporary bulkheads, support of open cut excavation, support of utilities, ground water control systems, forming and falsework; for underpinning; and for such other work as may be required for construction but does not become an integral part of the Project.
- B. Copies of Working Drawings as noted in Paragraph 1.05A. above, shall be submitted to the Engineer where required by the Contract Documents or requested by the Engineer, and shall be submitted at least thirty (30) calendar days (unless otherwise specified by the Engineer) in advance of their being required for work.
- C. Working Drawings shall be signed by a registered Professional Engineer, currently licensed to practice in the State of South Carolina and shall convey, or be accompanied by, calculation or other sufficient information to completely explain the structure, machine, or system described and its intended manner of use. Prior to commencing such work, Working Drawings must have been reviewed without specific exceptions by the Engineer, which review will be for general conformance and will not relieve the Contractor in any way from his responsibility with regard to the fulfillment of the terms of the Contract. All risks of error are assumed by the Contractor; the Owner and Engineer shall have no responsibility, therefore.

1.06 SAMPLES

- A. The Contractor shall furnish, for the approval of the Engineer, Samples required by the Contract Documents or requested by the Engineer. Samples shall be delivered to the Engineer as specified or directed. The Contractor shall prepay all shipping charges on Samples. Materials or equipment for which Samples are required shall not be used in work until approved by the Engineer.
- B. Samples shall be of sufficient size and quantity to clearly illustrate:
 - 1. Functional characteristics of the product, with integrally related parts and attachment devices.
 - 2. Full range of color, texture and pattern.
 - 3. A minimum of two (2) Samples of each item shall be submitted.

- C. Each Sample shall have a label indicating:
1. Name of Project.
 2. Name of Contractor and Subcontractor.
 3. Material or Equipment Represented.
 4. Place of Origin.
 5. Name of Producer and Brand (if any).
 6. Location in Project.

(Samples of finished materials shall have additional marking that will identify them under the finished schedules.)

- D. The Contractor shall prepare a transmittal letter in triplicate for each shipment of Samples containing the information required in paragraph 1.06B. above. He shall enclose a copy of this letter with the shipment and send a copy of this letter to the Engineer. Approval of a Sample shall be only for the characteristics or use named in such approval and shall not be construed to change or modify any Contract requirements.
- E. Approved Samples not destroyed in testing shall be sent to the Engineer or stored at the site of the work. Approved Samples of the hardware in good condition will be marked for identification and may be used in the work. Materials and equipment incorporated in work shall match the approved Samples. Samples which failed testing or were not approved will be returned to the Contractor at his expense, if so requested at time of submission.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01340

SECTION 01370

SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 Description:

- A. Work Included: Provide a detailed breakdown of the agreed Contract Sum showing values allocated to each of the various parts of the work, as specified herein, and in other provisions of the Contract Documents.
- B. Related Work: Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, and 01025 Measurement and Payment.

1.2 Quality Assurance:

- A. Use required means to assure arithmetical accuracy of the sum described.
- B. When so required by the Engineer, provide copies of the subcontracts or other data acceptable to the Engineer substantiating the sums described.

1.3 Submittals:

Prior to commencement, submit a proposed schedule of values to the Engineer.

- A. Meet with the Engineer and determine data, if any, required to be submitted.
- B. Secure the Engineer's approval of the values prior to commencement.

END OF SECTION

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**SECTION 01381
CONSTRUCTION AUDIO-VIDEO RECORDING**

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

Progress video tapes shall be made at periodic intervals, not to exceed 30 days, showing the extent and progress of the work performed as of that date. Video tapes shall be taken at each location of work on the day ending the period for which partial payment is requested, during the development of stages and condition of work, and as directed by the Engineer. Typical pipeline work shall be videotaped at different stages of construction at the direction of the Engineer.

- A. Initial video tape inspection of existing conditions shall be taken no later than 14 calendar days after notice to proceed and prior to beginning of any construction.
- B. At each specified time, take video tapes of each major area of work.
- C. Final video tapes shall be submitted and approved by the Engineer/Town prior to final acceptance and payment.

1.2 QUALITY ASSURANCE

- A. Video Camera Operator: The operator may be an employee of the Contractor and must be completely familiar with the proper operation of the video recording device (digital camera) and how to create a DVD. Employ operator only after review of his qualifications by Engineer.

1.3 SUBMITTALS

- A. Submit qualifications and experience record of operator.
- B. DVDs shall be submitted to the Engineer at the time of each payment request and shall become the property of the Town.

PART 2- PRODUCTS

2.1 VIDEO REPORT

- A. Provide a high quality DVD in a MPEG2 format video with a standard resolution of 720x480. Use a camera with lighting suitable to allow a clear picture of the entire project site.

2.2 DIGITAL FILE

- A. Recording can also be completed, stored and submitted as a digital file in Microsoft, Windows, Quicktime, Flash or other formats with file extensions such as AVI, MOV, WMV, etc.

2.3 DIGITAL CAMERA

- A. The video camcorder shall have a minimum resolution of 18.20 megapixels, sensor size 1/2.3-inch with an optical zoom; criteria based off Sony CyberShot DSC Wx500 but any approved equal is acceptable.
- B. At the end of the project all DVDs with index based on elapsed time of tape shall become the property of the Town.

PART 3 - EXECUTION

3.1 GENERAL

- A. The following location information shall be provided on color audio-video tape recording.
 - 1. Audio: Each recording shall begin with a verbal description of the current date, project name and municipality and be followed by the general location, name of the street, viewing side and direction of progress.
 - 2. Video: Transparent information must appear on the viewing screen. This information will consist of the date and time of recording. The date information will contain the month, day and year.
 - 3. Digital: To preclude the possibility of tampering or editing in any manner, all video recordings by electronic means must display continuously and simultaneously generated transparent digital information to include the date and time of recording. The date information will include the month, day and year.
- B. The taped coverage shall include all surface features located within the zone of influence of construction supported by appropriate audio description. Audio description shall be made simultaneously with video coverage. Such coverage shall include, but not be limited to, all existing driveways, sidewalks, fences, curbs, ditches, roadways, landscaping, trees, culverts, headwalls, retaining walls, or buildings located within such zone of influence. Particular and detailed attention shall be given to any defects noted, such as cracks, disturbed areas, damaged items, or as may be required by the Engineer. It is the intent of this coverage to accurately and clearly document pre-existing conditions and especially any items that could result in construction claims. The excavation areas shall be physically marked with high visibility fluorescent paint prior to videotaping. The markings shall include the job number and stationing.
- C. The zone of influence shall be defined as an area within 30 feet of the proposed work.
- D. The Contractor shall be able to televise and tape areas with paved roads, along co-owned easements through parks, lawns, and open fields. If videotaping on private property, the Contractor shall give the Town sufficient prior notice of such entry so that Owners may be advised of and their permission obtained for the work.
- E. To produce the proper detail and perspective, adequate lighting will be required to fill in the shadow area caused by trees, utility poles, road signs and other such objects in residential areas or as directed by the Engineer.
- F. Houses and buildings shall be identified visually by house number, when visible, in such a manner that structures of the proposed system, manholes on a sewer system and hydrants on a water system can be located by reference.
- G. The rate of speed in the general direction of travel of the conveyance used during taping shall not exceed 48 feet per minute in residential areas, nor exceed 100 feet per minute in non-residential areas. Panning rates and zoom-in, zoom-out rates shall be controlled sufficiently such that during playback will produce clarity of the object viewed. The playback picture shall be in focus and be of extreme clarity at all times.
- H. All taping shall be done during times of good visibility. No taping shall be done during periods of visible precipitation unless otherwise authorized by the Engineer.
- I. The Town shall have the authority to designate what areas may be omitted or added for audio-video coverage.

- J. All DVDs shall be properly identified by DVD number, location and project name and municipality in a manner acceptable to the Town.
- K. A record of the contents of each DVD shall be supplied by an index sheet identifying each segment in the recording by location, i.e., street or road viewing, elapsed time of video (no counter numbers), viewing side, point starting from, traveling direction and ending destination point.
- L. Any portion of the recording not conforming to specifications shall be rejected.
- M. Any recording not acceptable to the Town shall be refilmed at no additional charge. The Contractor shall reschedule unacceptable coverage within five (5) days after being notified.
- N. All recordings shall be performed by Contractor and reviewed and accepted prior to construction.
- O. One (1) original and one (1) copy are to be provided. Original to Town and copy to Engineer.

3.2 PROGRESS CONSTRUCTION VIDEO

- A. Submit DVDs on a monthly basis to accompany each request for progress payment to the Town and Engineer.

END OF SECTION

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SECTION 01410
TESTING LABORATORY SERVICES

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Unless otherwise noted in a Section of the Technical Specifications, the Contractor shall employ and pay for the services of an Independent Testing Laboratory to perform specified testing of work and materials at the Project Site or at point of manufacture.
- B. The Contractor shall comply with and be responsible for all of the requirements of the Project Manual, without exception.

1.02 RELATED REQUIREMENTS

- A. Conditions of the Contract: Inspections and testing required by laws, ordinances, rules, regulations, orders, or approvals of public authorities.
- B. Each specification section listed: Inspection and laboratory testing required, and standards for testing.
- C. Division 1, General Requirements of the Project Manual.

1.03 QUALIFICATIONS OF LABORATORY

- A. Meet “Recommended Requirements for Independent Laboratory Qualification,” published by American Council of Independent Laboratories.
- B. Comply with the following requirements:
 - 1. ANSI/ASTM D3740: Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
 - 2. ANSI/ASTM E329: Standard Recommended Practice for Inspection and Testing for Concrete, Steel, and Bituminous Materials as Used in Construction.
- C. Authorized to operate in the State of South Carolina
- D. Submit copy of report of inspection of facilities made by Materials Reference Laboratory of National Bureau of Standards during the most recent tour of inspection, with memorandum of remedies of any deficiencies reported by the inspection.
- E. Testing Equipment:
 - 1. Calibrated at reasonable intervals by devices of accuracy traceable to either:
 - a. National Bureau of Standards.
 - b. Accepted values of natural physical constants.

- F. Employment of testing laboratory shall in no way relieve Contractor of obligation to perform Work in accordance with requirements of Construction Contract Documents.
- G. Failure on part of Owner to make any tests of materials shall in no way relieve the Contractor of responsibility of furnishing materials or performing work conforming to the Construction Contract Documents.

1.04 LABORATORY DUTIES

- A. Cooperate with the Owner and Contractor; provide qualified personnel after due notice from Contractor.
- B. Perform specified inspections, sampling and testing of materials and methods of construction:
 - 1. Comply with specified standards.
 - 2. Ascertain compliance of materials with requirements of Contract Documents.
- C. Promptly notify Owner and Contractor of observed irregularities or deficiencies of work or products.
- D. Promptly submit written report of each test and inspection: one (1) copy each to Owner, noted Agencies, and Contractor. Each report shall include:
 - 1. Date issued.
 - 2. Project title and Bid Number
 - 3. Testing laboratory name, address and telephone number.
 - 4. Name and signature of laboratory inspector.
 - 5. Date and time of sampling or inspection.
 - 6. Record of temperature and weather conditions.
 - 7. Date of test.
 - 8. Identification of product.
 - 9. Location of sample or test in the Project.
 - 10. Type of inspection or test.
 - 11. Results of tests and compliance with Contract Documents.
 - 12. Interpretation of test results, when requested by Owner
- E. Perform additional tests as may be required by the Owner.

1.05 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

- A. Laboratory is not authorized to:
 - 1. Release, revoke, alter or enlarge on requirements of Contract Documents.
 - 2. Approve or accept any portion of the Work.
 - 3. Perform any duties of the Design/Builder.
 - 4. Stop the Work.

1.06 CONTRACTOR'S RESPONSIBILITIES

- A. Cooperate, together with laboratory personnel, will provide access to the point/location of the Work, and to manufacturer's operations.
- B. Secure and deliver to laboratory at designated location(s) adequate quantities of representational material proposed to be used and which require testing together with applicable proposed design mixes.
- C. Provide to the laboratory the preliminary design mix proposed to be used for concrete, and other material mixes which required control by the testing laboratory.
- D. Furnish copies of Products test reports to the Owner as required.
- E. Furnish incidental labor and facilities:
 - 1. To provide access to Work to be tested.
 - 2. To obtain and handle samples at the Project Site or at the source of the product to be tested.
 - 3. To facilitate inspections and tests.
 - 4. For storage and curing of test samples.
- F. Notify laboratory twelve (12) hours in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.
 - 1. When tests or inspections cannot be performed after such notice, reimburse Owner for laboratory personnel and travel expenses incurred due to Contractor's negligence on inability to perform the Work at the scheduled time.
- G. Make arrangements with laboratory and pay for services to perform inspections, sampling and testing required:
 - 1. For the Contractor's convenience.
 - 2. When the initial tests or inspections indicate Work does not comply with Contract Documents (i.e., re-tests).

1.07 SOURCE OF MATERIALS

- A. Source of supply of each of materials required shall be acceptable to the Owner and before delivery is started.
- B. Representative samples shall be submitted for inspection or tests.
- C. Results obtained from testing samples will be used for preliminary approval, but will not be used as final acceptance of materials.
- D. The Owner may test materials proposed to be used at any time during preparation and use.

- E. If it is found that sources of supply, which have been approved, do not furnish product of uniform quality, or if product from any source proves unacceptable at any time, Contractor shall furnish approved material from another source without additional cost to Owner or delay in completion date.

1.08 IDENTIFICATION

- A. Required samples submitted by Contractor shall be properly labeled for identification.
- B. Materials and/or equipment that have been inspected and/or tested shall be stored in a controlled area with suitable identification referencing tests and certifications.
- C. Continuous inventory shall be kept of all items in this area controlled by log in and log out with receiving and disbursing signatures.
- D. Copies of receiving or disbursing actions shall be sent to the Owner on a daily basis.
- E. Disbursing records shall show final destination and installation.

1.09 MATERIAL STORAGE

- A. Materials shall be stored so as to ensure preservation of their quality and fitness for Work, in accordance with requirements of the Project Manual.

1.10 SCHEDULE OF INSPECTIONS AND TESTS

- A. Refer to each individual Section of the Project Manual for specific testing requirements, or as otherwise required by the Contract Documents or appropriate regulatory agency.

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

Not Used.

END OF SECTION 01410

**SECTION 01510
TEMPORARY CONSTRUCTION CONTROLS**

PART 1- GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall comply with and be responsible for all of the requirements of the Project Manual, without exception.
- B. Furnish, install and maintain temporary controls required for construction.
- C. Remove at completion of Work.

1.02 RELATED REQUIREMENTS

- A. Division 1, General Requirements of the Project Manual.

1.03 CONSTRUCTION SITE CLEANING

- A. Maintain areas within limits of the Project Work Site free of extraneous debris and litter.
- B. Initiate and maintain specific program to prevent accumulation of debris at construction site, storage and parking areas, or along access roads and off site hauls routes.
 - 1. Furnish on-site containers for collection of waste materials, debris and rubbish.
 - 2. Prohibit overloading of trucks to prevent spillage on access and haul routes.
 - 3. Provide periodic inspection of traffic areas to enforce requirements.
 - 4. Remove waste material, debris and rubbish from site and building area daily, or sooner as otherwise needed.
 - 5. Do not drop or throw materials from heights. Lower waste material in a controlled manner and with as few handlings as possible.
 - 6. During entire construction period, and at all times, keep the site access entry road, parking areas free from accumulation of waste materials, debris and rubbish caused by the Work of this Project.
 - 7. Dirt and debris shall be removed from all surfaces prior to closure of all areas (walls, ceilings, chases, etc.).
- C. Hazards Control:
 - 1. Store volatile wastes in covered metal containers.
 - 2. Remove containers from premises daily.
 - 3. Prevent accumulation of wastes, which create hazardous conditions.
 - 4. Provide adequate ventilation during use of volatile or noxious substances.
- D. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws:
 - 1. Do not burn or bury rubbish and waste materials on project site.

2. Do not dispose of wastes into streams or waterways.
3. Do not dispose of volatile wastes such as mineral spirits, oil or paint thinner in storm or sanitary drains.

1.04 DUST CONTROL

- A. Provide positive methods and apply dust control materials to minimize raising dust from construction operations and provide positive means to prevent air-borne dust from dispersing into atmosphere.
- B. Clean interior building areas to prevent accumulation of dirt and debris and execute prior to start of finish painting, special coatings, and/or other finish material installations.
- C. Wet down materials and rubbish to prevent blowing dust.
- D. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.
- E. Continue cleaning on an as-needed basis until building and/or site is ready for beneficial occupancy.

1.05 EROSION AND SEDIMENT CONTROL

- A. Plan and execute construction and earthwork by methods to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation. Wetland areas shall be protected as well.
 1. Hold areas of bare soil exposed at one time to minimum.
 2. Provide temporary control measures such as berms, dikes, and drains.
 3. Comply with federal, state and local regulations.
- B. Construct fills and soil waste areas by selective placement to eliminate surface soils or clay, which will erode.
- C. Periodically inspect earthwork to detect any evidence of start of erosion, apply corrective measures as required by erosion control.

1.06 POLLUTION CONTROL

- A. Provide methods, means and facilities required to prevent contamination of soil, water or atmosphere by discharge of noxious substances from construction operations.
- B. Contractor is responsible only for pollution control of the immediate Work of Contract, the actions and operations of the Contractor, and the workers employed or contracted to Contractor. Provide equipment and personnel to perform emergency measures required to contain spillage, and to remove contaminated soil or liquids.

- C. Take special measures to prevent harmful substances from entering public waters. Prevent disposal of wastes, effluents, chemicals or other such substances adjacent to basins, or in sanitary or storm sewers.
- D. Provide systems for control of atmospheric pollutants. Prevent toxic concentrations of chemicals. Prevent harmful disposal of pollutants into atmosphere.

1.07 WATER CONTROL

- A. Provide methods to control surface water to prevent damage to project site or adjoining properties. Control fill, grading, and ditching to direct surface drainage away from excavations, pits, tunnels and other construction areas. Direct drainage to proper runoff.
- B. Provide, operate, and maintain hydraulic equipment of adequate capacity to control surface and water.
- C. Dispose of drainage water in manner to prevent flooding, erosion or other damage to any portion of site or adjoining areas.
- D. Dewater areas in accordance with applicable local and state requirements and accepted professional practice.

1.08 EARTH CONTROL

- A. Contractor shall, at his/her sole cost, remove excess soil, pier spoils, etc., at time of generation.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTIONS

3.01 REMOVAL

- A. Contractor shall, at his/her sole cost, remove temporary construction controls at completion of Work or as required by execution of Work.

END OF SECTION 01510

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SECTION 01511

PROJECT SIGN REQUIREMENTS

Notations – Contractor shall be responsible for providing sign with name of current President of the United States. Additional update under “Colors:” section of specification, sign shall not include: “Putting America to Work”. Sign mock-up shall be submitted as a shop drawing submittal in accordance with Section 01340: Shop Drawings, Working Drawings and Samples.

EDA PROJECT SIGN

The Contractor shall supply, erect, and maintain in good condition a project sign according to the specifications set forth below:

EDA SITE SIGN SPECIFICATIONS

Size: 4' x 8' x ¾"

Materials: Exterior grade/MDO plywood (APA rating A-B)

Supports: 4" x 4" x 12' posts with 2" x 4" cross branching

Erection: Posts shall be set a minimum of three feet deep in concrete footings that are at least 12" in diameter.

Paint: Outdoor enamel

Colors: Jet Black, Blue (PMS300), and Gold (PMS7406). Specifically, on white background the following will be placed:

The U. S. Department of Commerce seal in blue, black, and gold;

“EDA” in blue;

“U. S. DEPARTMENT OF COMMERCE ECONOMIC DEVELOPMENT
ADMINISTRATION” in black;

“In partnership with” in blue;

(Actual name of the) “EDA Grant Recipient” in black;

“PUTTING AMERICA TO WORK” in blue;

“Donald J. Trump, President of the United States” in black.

Lettering: Specific fonts are named below; positioning will be as shown on the attached illustration.

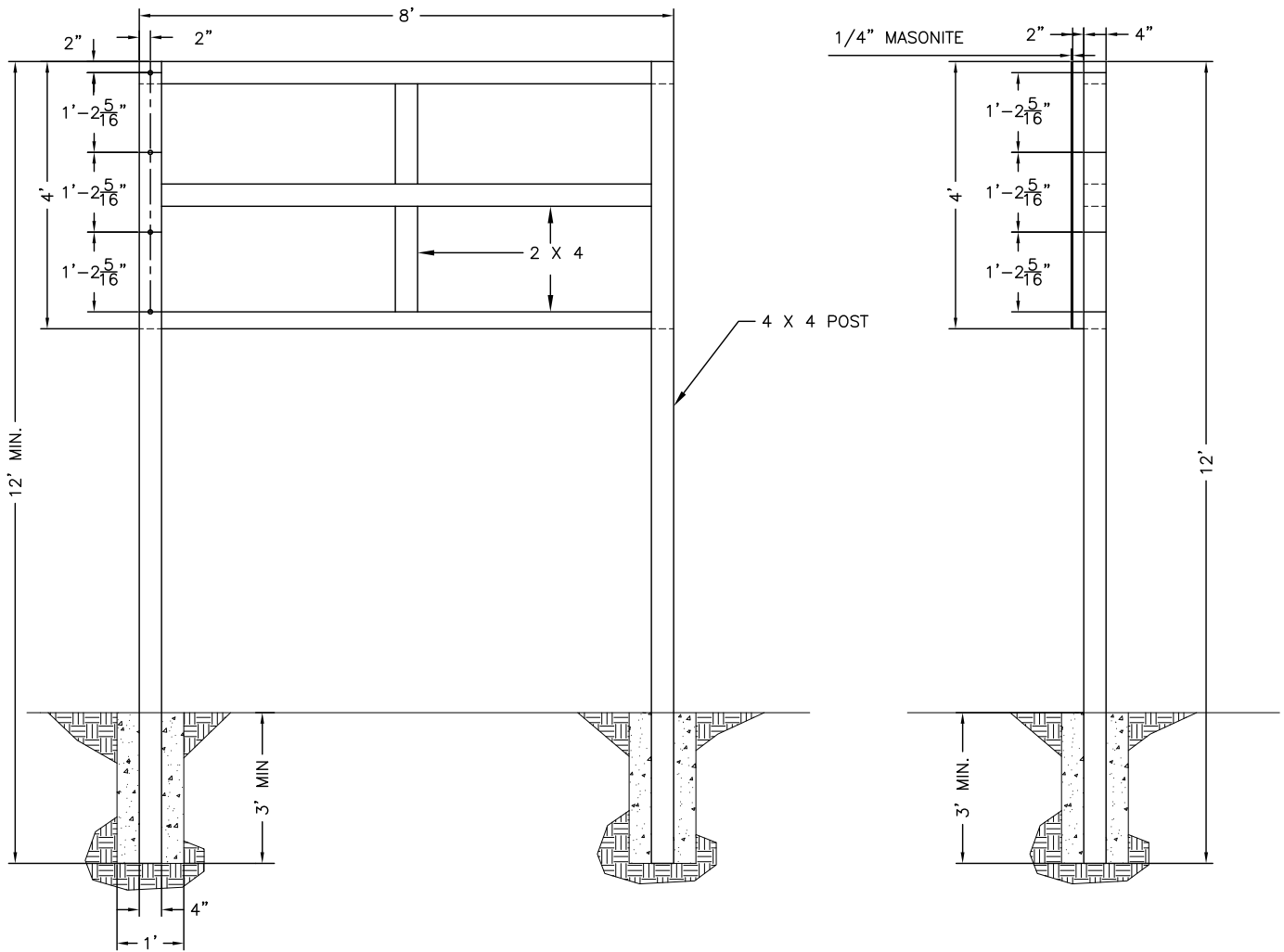
“U. S. DEPARTMENT OF COMMERCE ECONOMIC DEVELOPMENT
ADMINISTRATION” use Bank Gothic Medium - **BANK GOTHIC MED**

“In partnership with” use Univers™ 55 Oblique - **Univers 55**

(Name of) “EDA Grant Recipient” use Univers™ Extra Black 85 **Univers 85**

Project signs will not be erected on public highway rights-of-way. If any possibility exists for obstruction to traffic line of sight, the location and height of the sign will be coordinated with the agency responsible for highway or street safety in the area.

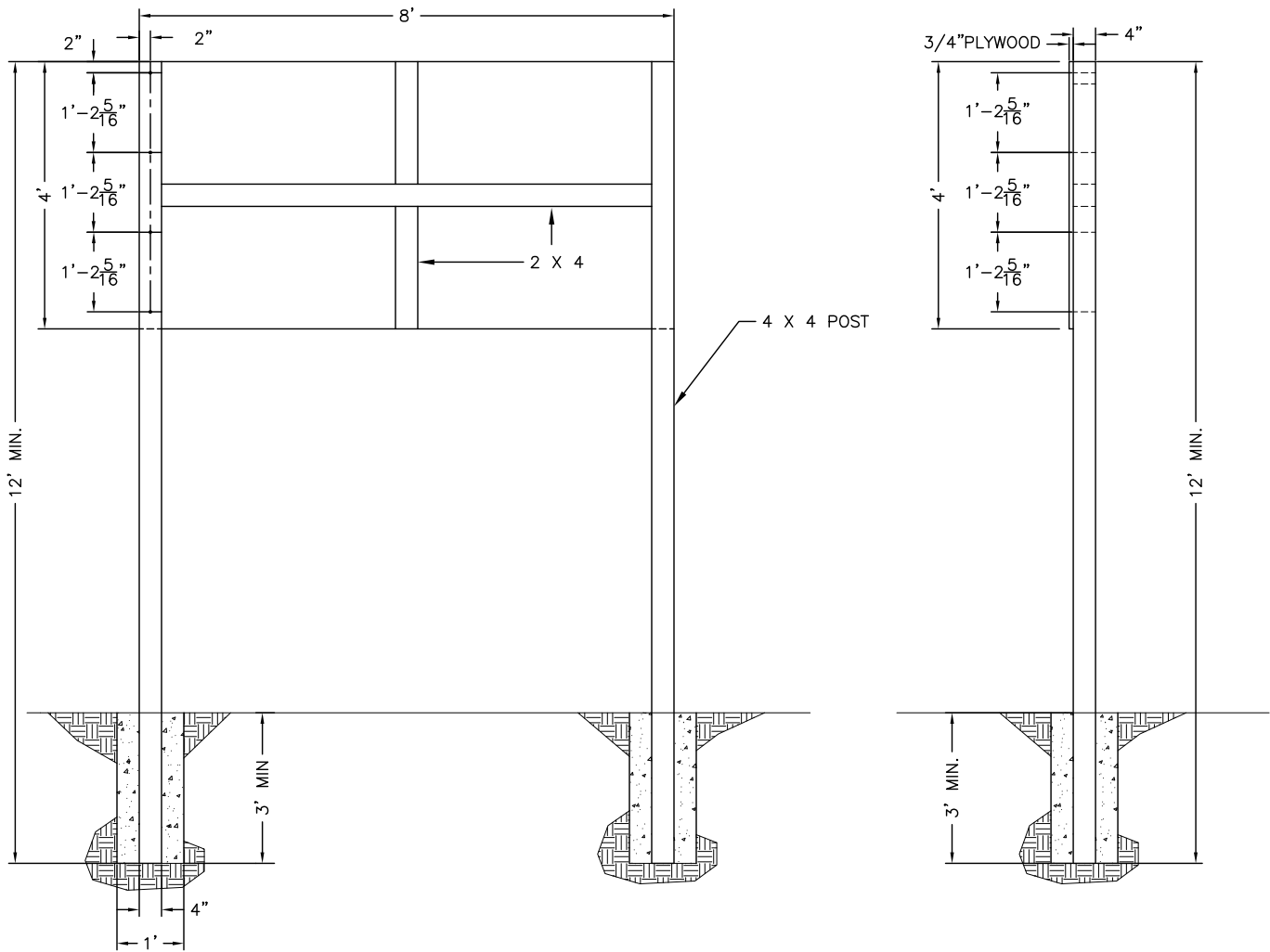
The EDA Regional Director may permit modifications to these specifications if they conflict with state law or local ordinances.



SIGN A
MASONITE SIGN
SCALE: 3/8" = 1'

PROJECT - SIGN A

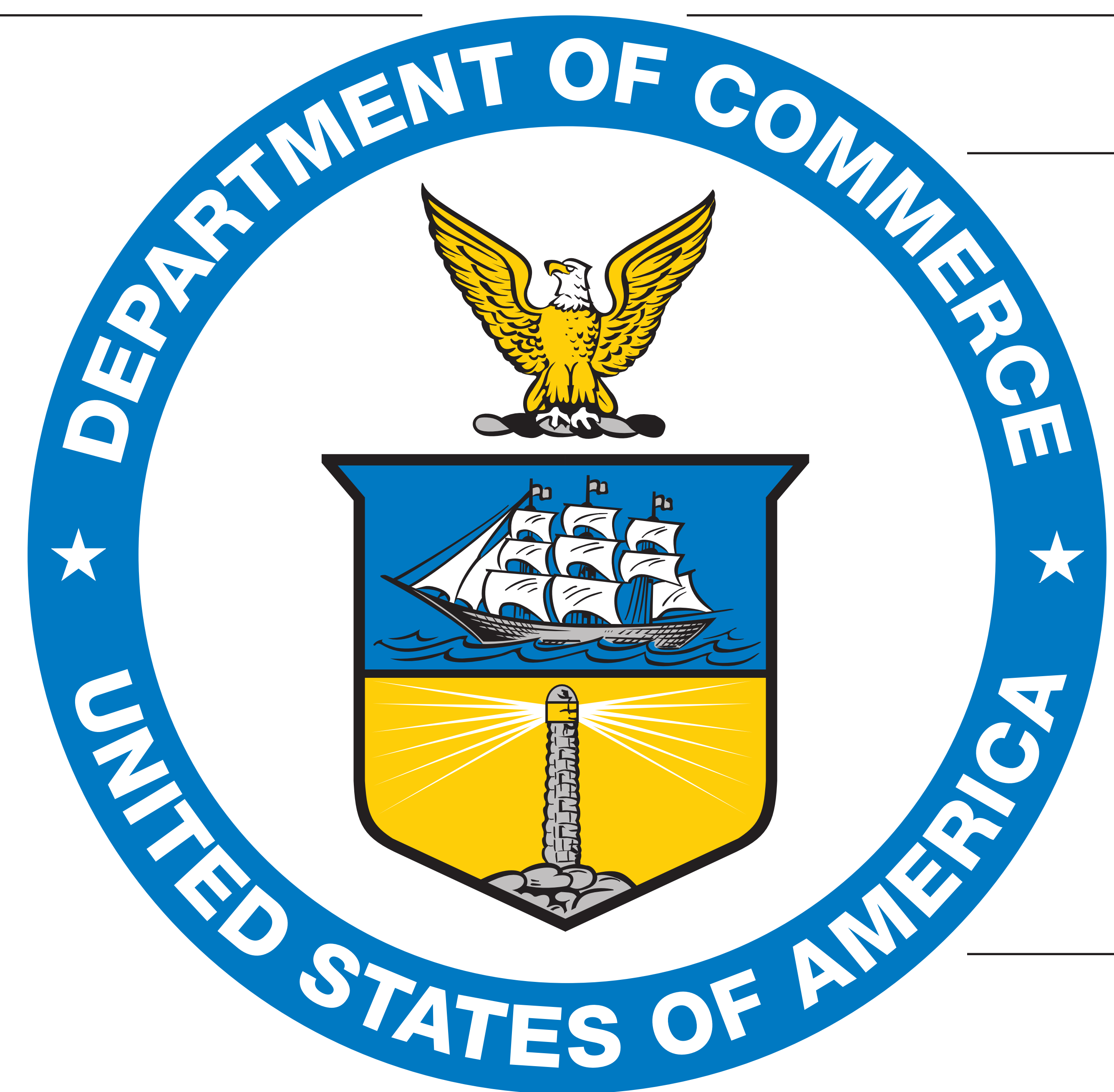
ECONOMIC DEVELOPMENT ADMINISTRATION



SIGN B
PLYWOOD SIGN
SCALE: 3/8" = 1'

PROJECT - SIGN B

ECONOMIC DEVELOPMENT ADMINISTRATION



EEDA

Black
Blue= PMS300
Gold= PMS7406

U.S. DEPARTMENT OF COMMERCE ECONOMIC DEVELOPMENT ADMINISTRATION

In partnership with

Recipient Name

Joseph R. Biden, Jr., President of the United States



SECTION 01563
HANDLING OF INCIDENTAL FUEL SPILLAGE DURING CONSTRUCTION

PART 1 – GENERAL

1.01 RELATED REQUIREMENTS

- A. Division 0, Bidding and Contract Documents in the Project Manual.
- B. Division 1, General Requirements in the Project Manual.
- C. South Carolina Dept. of Health and Environmental Controls (SCDHEC).

1.02 SCOPE

- A. This section consists of procedures to be followed in handling material contaminated with petroleum fuel products (hydrocarbons including petroleum, petroleum derivatives, hydraulics and like products) caused by incidental spillage (including leaks) from the Contractor's or his/her prime and sub-contractor's equipment.

Incidental spillage shall mean spillage of a quantity not greater than 25 gallons per incident, of vehicular or mechanical equipment fuel products, onto open ground and absorbed or not absorbed by the soils.

Spillage or leakage of petroleum fuel products in quantities in excess of 25 gallons shall be immediately remediated by the Contractor using applicable and appropriate procedure(s). Whenever such spillage or leakage occurs, the Contractor shall immediately implement the appropriate corrective actions as required.

- B. The provisions of this Section are limited to incidental petroleum fuel spillage on ground surfaces and it excludes fuel spillage onto surface waters.

1.03 APPLICABLE CODES

- A. The Contractor shall comply with all prevailing federal, state, and local environmental protection ordinances and codes governing and having application to and any discharges, intentional or accidental, which may cause water pollution and constitute a nuisance, and sanitary nuisance.
- B. Leaks and spillage may occur when using mechanical equipment. Equipment generated or lubricated with petroleum products, are prone to leaks or spillages, therefore proper management of "spillage incidents" is essential.

PART 2 – PRODUCTS

2.01 ABSORBENT MATERIALS

Contractor shall equip crews and/or provide machinery with the most efficient type of petroleum absorbent materials. These materials are available at petroleum equipment suppliers and must be readily accessible so that spillages can be quickly contained and prevented from becoming greater incidents. Fiber material, sand or cat litter may be used as an absorbent material. Sufficient

quantity of absorbent material capable of absorbing up to 25 gallons of petroleum fuel products shall be stocked at the job site at all times.

PART 3 - EXECUTION

3.01 PROCEDURES

- A. Personnel handling waste materials must have a minimum of 40 hours training as defined in 29 CFR 1910.120 and in accordance with the certified OSHA course.
- B. Perform work as specified herein and in accordance with the applicable provisions of South Carolina Dept. of Health and Environmental Controls (SCDHEC). No payment will be made to the Contractor for the cost of handling and disposing of leaks, spillages and materials contaminated by such leaks or spillages.

The procedure for the proper handling and disposal of contaminated soils and absorbent materials is readily available through the aforementioned agencies.

- C. The steps outlined below are minimum requirements and are merely presented as guidelines. They do not constitute a complete compliance procedure.

STEP 1:

If a fuel contamination to open ground has been discovered, check for the origin of that leak or spillage. Then stop the spillage or leak and positively contain it, and then use absorbents to collect the discharged liquid. Immediately notify the Owner.

STEP 2:

Sand may be used to absorb ground surface spills while absorbent materials may be used to absorb ground spills as well as surface water spills.

Once absorption of spilled fuels is complete the impacted (contaminated) absorbent materials shall be stored in 55-gallon steel drums (100-150 lbs.). If leaked or spilled fuel has been absorbed into the soils, excavate and containerize the impact (contaminated) soils. Soils may be stored in 55- gallon steel drums.

STEP 3:

The contaminated materials must be collected, containerized and otherwise properly stored and labeled prior to transport to a pre-approved storage, disposal or treatment facility. All drums used to store impacted (contaminated) absorbent material and/or contaminated soils shall be properly sealed and labeled with the following information.

Name of Company (Contractor)

Contract or Project No.:

Location of origin:

Type of contents:

Type of containment:

Quantity: (e.g. 1 of 1)

Date:

Containerized by:
Labeled by:

END OF SECTION 01563

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**SECTION 01570
TRAFFIC REGULATION**

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall comply with and be responsible for all of the requirements of the Project Manual, without exception.
- B. Construction parking control, flagmen, flares and lights, haul routes, traffic signs and signals, and removal.
- C. Maintenance of safety and convenience of public.

1.02 RELATED WORK

- A. Division 1, General Requirements of the Project Manual.

1.03 PUBLIC SAFETY AND CONVENIENCE

- A. Materials and equipment shall be stored and Work conducted to minimize obstruction to pedestrian movement and vehicular traffic. Materials and equipment stored in or near path of traffic shall be protected with appropriate warning signs and barricades. At night, or as otherwise required, equipment not in use shall be stored in such manner and location to not interfere with safe passage of pedestrians and vehicles. Contractor shall provide and maintain flagmen at points and for periods of time required to provide safety and convenience of traffic, and as directed by the Owner or project permits.
- B. Contractor shall not close traffic to any bridge or any other portion of public road except as may be designated by the Owner. Prior to closing any access way and/or structure coordinate work schedule with the Owner.
- C. Contractor shall provide the Owner with notice at no less than 48 hours prior to movement of heavy equipment and/or wide or slow moving vehicles to or from Project Site. Contractor shall strictly adhere to vehicular routes established or as may be directed by the Owner or project permits.

1.04 LANE CLOSURE RESTRICTIONS

Contractor shall be responsible to verify with the Town of Ridgeland and/or South Carolina Department of Transportation (SCDOT), as appropriate, lane closure restriction hours. Contractor to verify restrictions on lane closures near schools and meet the required regulations.

Any work on SCDOT roads shall be planned so that closure of intersecting streets, road approaches or other access points is held to a minimum.

1.05 TRAFFIC CONTROLS AND SIGNALS

Traffic controls for utility construction and maintenance operations shall conform with the SCDOT Standard Drawings and Manual on Uniform Traffic Control Devices (MUTCD). All construction and maintenance operations shall be planned with full regard for safety and to keep traffic interference to an absolute minimum.

The contractor shall : a) provide, erect and maintain all necessary barricades, lights, danger signals, signs and other control devices, provide qualified, trained and equipped flaggers and watchmen where necessary, as may be directed by the Owner or SCDOT; b) take all necessary precautions for the protection of the Work, the warning that work is under construction and the safety of the public. Suitable advance warning signs shall be erected in advance where operations interfere with the use of the road by traffic. Where a lane, or a portion of a lane is closed, traffic control devices and flaggers shall be used in accordance with the Standard Drawings and MUTCD. All barricades, signs and traffic control devices shall conform to the requirements of the MUTCD.

1.06 HAUL ROUTES

Based on regulations prescribed by the Town of Ridgeland, SCDOT, or other agency having jurisdiction, use only established roadways or use temporary roadways constructed by the contractor when and as authorized by the Owner. When materials and/or equipment are being transported in executing the Work, vehicles shall not be loaded beyond loading capacity recommended by manufacturer of vehicle or prescribed by federal, state or local law or regulation. When it is necessary to cross curbs or sidewalks contractor shall protect them from damage. Contractor shall repair / replace or pay for all damaged curbs, sidewalks, roads, and / or paving.

1.07 EQUIPMENT STORAGE

When equipment is not in use, on roadways open to public travel, contractor's equipment and vehicles shall be kept at least thirty (30) feet from the edge of the travel lanes. On Interstate routes or Freeways, no vehicles or equipment will be permitted on the shoulders at any time.

1.08 FLARES AND LIGHTS

Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic in landside areas only.

PART 2 – PRODUCTS

2.01 SIGNS, SIGNALS AND DEVICES

- A. Post-mounted and wall-mounted at parking areas to indicate spaces designated for use by construction personnel.

- B. Traffic control signals, as may be required, and as approved by SCDOT and the Town of Ridgeland, as appropriate.
- C. Traffic cones and drums and lights, as approved by SCDOT and the Town of Ridgeland, as appropriate.
- D. Flagmen equipment as required by SCDOT and the Town of Ridgeland, as appropriate.

PART 3 – EXECUTION

3.01 REMOVAL

- A. Contractor shall remove equipment and devices, at his/her sole cost, when no longer required. Repair damage caused by installation. Remove post settings to depth of three (3) feet.

END OF SECTION 01570

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**SECTION 01700
EXECUTION REQUIREMENTS**

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Contractor shall comply with and be responsible for all of the requirements of the Project Manual without exception.
- B. Contractor shall provide field engineering and general layout services required on the project as follows:
 - 1. Civil, structural or other professional engineering services specified, or required to execute construction methods.
 - 2. Survey work required for execution of the total Work of the Project.
 - 3. Continuous horizontal and vertical control regarding layout and execution of Work of the Project, as appropriate.
 - 4. Coordinate field engineering services with the Owner.

1.02 RELATED REQUIREMENTS

- A. Division 1, General Requirements of the Project Manual.
- B. The Drawings and all sections of the Technical Specifications as may be applicable.

1.03 CONTROLS

- A. Contractor will establish primary controls, horizontal and vertical control points at various locations at the Site. These will be described and indicated on the Contractor's as constructed drawings and will be coordinated in the field by the Contractor.
- B. Existing control points and property line markers will be shown on the Construction Contract drawings.

1.04 QUALIFICATIONS OF SURVEYOR OR ENGINEER

- A. For required surveying, a qualified engineer or land surveyor, registered in the State of South Carolina and acceptable to the Owner.
- B. For required engineering, a registered professional engineer of a discipline required for this Project licensed in the State of South Carolina and acceptable to the Owner.

1.05 SURVEY REFERENCE POINTS

- A. Existing horizontal and vertical control points for the Project are those designated on the Construction Contract drawings or as determined from investigation of the existing conditions.
- B. Verify property lines, grades, levels and dimensions indicated.
- C. Locate and protect control points prior to starting Site Work and preserve permanent reference points during construction.
 - 1. Make no changes or relocations without prior approval of the Owner
 - 2. Report to the Owner when a reference point is lost, destroyed or requires relocation because of necessary changes in grades or locations.
 - 3. Require surveyor to replace Project control points, which may be lost or destroyed.

1.06 PROJECT LAYOUT REQUIREMENTS

- A. Establish a sufficient number of permanent benchmarks on Site, as may be required, referenced to data established by survey control points. Record locations of benchmarks with horizontal and vertical data on Project Record Documents, Section 01781.
- B. From established control points, layout all new construction Work by establishing all lines and grades at Site necessary to control Work. Contractor shall be responsible for all measurements that may be required for execution of Work.
- C. Furnish, at own expense, all such stakes, steel pins, equipment, tools and material and labor that may be required in laying out Work control points.
- D. Establish lines and levels, locate and layout by instrumentation and similar appropriate means:
 - 1. Site Improvements
 - a. Stakes for grading, fill, and topsoil placement.
 - b. Utility slopes and invert elevations for new utility construction.
 - c. Limits of pavement (pervious concrete and asphalt).
 - 2. Batter boards for structures.
 - 3. Building foundation column locations, piling and floor levels.
 - 4. Controlling lines and levels required for mechanical and electrical trades.
- E. Verify and coordinate in field all existing and proposed underground components including civil, structural, utilities and other components prior to initiation of the Work. Advise the Owner of any conflicts or discrepancies.

1.07 SUBMITTALS AND DOCUMENTS

- A. Submit name and address of Surveyor and Professional Engineer to the Owner
- B. On request of the Owner, submit documentation to certify accuracy of field engineering work and compliance with Contract Documents.

- C. Submit certificate signed by registered engineer or surveyor certifying that elevations and locations of improvements are in conformance, or non-conformance, with Contract Documents.
- D. Standards and Availability: Data and other measurements shall be recorded in accordance with standard and approved methods. All field notes, sketches, recordings, and computation in establishing above horizontal and vertical control points shall be available at all times during progress of Work for ready examination by the Owner.
- E. Maintain complete and accurate record data on underground utilities and obstructions, new and existing, encountered in execution of Work. Record data on Project Record Documents in accordance with requirements of Section 01781, Project Record Documents.
- F. On completion of the sewer main, sewer service laterals, and other major site improvements, prepare as-constructed drawings showing appropriate survey elevations of construction and dimensions, locations, and angles.
- G. Submit, upon request by the Owner, signed and sealed Engineering Calculations.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION 01700

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**SECTION 01730
OPERATING AND MAINTENANCE DATA**

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope of Work:

1. Compile product data and related information appropriate for Town's maintenance and operation of products furnished under Contract. Prepare operating and maintenance data as specified in this Section and as referenced in other pertinent sections of Specifications.
2. Instruct Town's personnel in maintenance of products and in operation of equipment and systems.

1.2 QUALITY ASSURANCE

A. Preparation of Data Shall be done by Personnel:

1. Trained and experienced in maintenance and operation of described products.
2. Familiar with requirements of the Specification section.
3. Skilled as technical writer to the extent required to communicate essential data.
4. Skilled as draftsman competent to prepare required drawings.

1.3 FORM OF SUBMITTALS

A. Prepare Data in Form of an Instructional Manual for use by Town's Personnel.

B. Format:

1. Size: 8-1/2 inches by 11 inches.
2. Paper: 20 pound minimum, white, for typed pages.
3. Test: Manufacturer's printed data, or neatly type written.
4. Drawings:
 - a. Provide reinforced punched binder tab, bind in with text.
 - b. Reduce larger drawings and fold to size of text pages but not larger than 11 inches by 17 inches.
5. Provide flyleaf for each separate product, or each piece of operating equipment.
 - a. Provide typed description of products and major component parts of equipment.

- b. Provide identified tabs.
 - 6. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS". List:
 - a. Title of Project.
 - b. Identity of separate structure as applicable.
 - c. Identity of general subject matter covered in the manual.
- C. Binders:
- 1. Commercial quality three-post binders with durable and cleanable plastic covers.
 - 2. Maximum post width: 2 inches.
 - 3. When multiple binders are used, correlate the data into related consistent groupings.

1.4 CONTENT OF MANUAL

- A. Neatly Typewritten Table of Contents for Each Volume, Arranged in Systematic Order.
- 1. Contractor information including name of responsible principal, address and telephone number.
 - 2. A list of each product required to be included, indexed to content of the volume.
 - 3. List, with each product, name, address and telephone number of:
 - a. Sub-Contractor or installer.
 - b. A list of each product required to be included, indexed to content of the volume.
 - c. Identify area of responsibility of each.
 - d. Local source of supply for parts and replacement.
 - 4. Identify each product by product name and other identifying symbols as set forth in Contract Documents.
- B. Product Data:
- 1. Include only those sheets, which are pertinent to the specific product.
 - 2. Annotate each sheet to:
 - a. Clearly identify specific product or part installed.
 - b. Clearly identify data applicable to installation.
 - c. Delete references to inapplicable information
- C. Drawings:
- 1. Supplement product data with drawings as necessary to clearly illustrate:

- a. Relations of component parts of equipment and systems.
 - b. Control and flow diagrams.
- 2. Coordinate drawings with information in Project Record Documents to assure correct illustration of completed installation.
- 3. Do not use Project Record Documents as maintenance drawings.
- D. Written Text, as required to supplement product data for the particular installation:
 - 1. Organize in consistent format under separate headings for different procedures.
 - 2. Provide logical sequence of instructions of each procedure.
 - 3. Copy of Each Warranty, Bond and Service Contract Issued.
 - 4. Provide information sheet for Town's personnel, give:
 - a. Proper procedures in event of failure.
 - b. Instances, which might affect validity of warranties or bonds.

1.5 MANUAL FOR MATERIALS AND FINISHES

- A. Submit Five (5) Copies of Complete Manual in Final Form.
- B. Content: For Architectural Products, Applied Materials and Finishes:
 - 1. Manufacturer's data, giving full information on products.
 - a. Catalog number, size, and composition.
 - b. Color and texture designations.
 - c. Information required for reordering special manufacturing products.
 - 2. Instructions for care and maintenance.
 - a. Manufacturer's recommendation for types of cleaning agents and methods.
 - b. Cautions against cleaning agents and methods which are detrimental to product.
 - c. Recommended schedule for cleaning and maintenance.
- C. Content for Moisture Protection on Weather-Exposed Products:
 - 1. Manufacturer's data giving full information on products.
 - a. Applicable standards.
 - b. Chemical composition.
 - c. Details of installation.
 - 2. Instructions for inspection, maintenance and repair.

D. Additional Requirements for Maintenance Data: Respective Sections of Specifications.

1.6 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Submit Five (5) Copies of Complete Manual in Final Form.

B. Content, for each unit of equipment and system, as appropriate:

1. Description of unit and component parts.
 - a. Function - normal operating characteristics, and limiting conditions.
 - b. Performance curves, engineering data and tests.
 - c. Complete nomenclature and commercial number of replaceable parts.
2. Operating Procedures:
 - a. Start-up, break-in, routine and normal operating instructions.
 - b. Regulation, control, stopping, shutdown and emergency instructions.
 - c. Summer and winter operating instructions.
 - d. Special operating instructions.
3. Maintenance Procedures:
 - a. Routine operations.
 - b. Guide to "trouble-shooting".
 - c. Disassembly, repair and reassembly.
 - d. Alignment, adjusting and checking.
4. Servicing and lubrication required.
5. Manufacturer's printed operating and maintenance instructions.
6. Description of sequence of operation by control manufacturer.
7. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.
 - a. Predicted life of parts subject to wear.
 - b. Items recommended to be stocked as spare parts.
8. As-installed control diagrams by controls manufacturer.
9. Each Contractor's coordination drawings. As-installed color-coded piping diagrams.
10. Charts of valve tag numbers, with location and function of each valve.
11. List of original manufacturer's spare parts, manufacturer's current prices and recommended quantities to be maintained in storage.

12. Other data as required under pertinent sections of specifications.
- C. Content for Each Electric and Electronic Systems, as appropriate:
1. Description of system and component parts.
 - a. Function - normal operating characteristics, and limited conditions.
 - b. Performance curves, engineering data and tests.
 - c. Complete nomenclature and commercial number of replaceable parts.
 2. Circuit directories and panelboards.
 - a. Electrical service.
 - b. Controls.
 - c. Communications.
 3. As installed color-coded wiring diagrams.
 4. Operating procedures:
 - a. Routine and normal operating instructions.
 - b. Sequences required.
 - c. Special operating instructions.
 5. Maintenance procedures:
 - a. Routine operations.
 - b. Guide to "trouble-shooting".
 - c. Disassembly, repair and reassembly.
 - d. Adjustment and checking.
 6. Manufacturer's printed operating and maintenance instructions.
 7. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
 8. Other data as required under pertinent sections of specifications.
- D. Prepare and Include Additional Data When the Need for Such Data Becomes Apparent during Instruction of Town's Personnel.
- E. Additional Requirements for Operating and Maintenance Data: Respective Sections of Specifications.

1.7 SUBMITTAL SCHEDULE

- A. Submit five (5) copies of preliminary draft of proposed formats and outlines of contents of Operating and Maintenance Manuals within 90 days after Notice to Proceed. The Engineer and Town will review the preliminary draft and return one (1) copy with comments.

- B. Submit five (5) copies of completed data in final form no later than 30 days following the Engineer's and Town's review of the last shop drawing and/or other submittal specified under Section 01340: Shop Drawings, Working Drawings and Samples. One (1) copy will be returned with comments to be incorporated into final copies.
- C. Submit five (5) copies of approved manual in final form directly to the offices of the Engineer, Four Waters Engineering, Inc., within 30 calendar days of product shipment to the project site and preferably within 30 days after the reviewed copy is received.
- D. Append five (5) copies of addendum to the operation and maintenance manuals as applicable and certificates as specified within 30 days after final inspection and start-up test.

1.8 INSTRUCTION OF TOWN'S PERSONNEL

- A. Prior to final inspection or acceptance, fully instruct Town's designated operating and maintenance personnel in operation, adjustment and maintenance of products, equipment and systems.
- B. Review contents of operating and maintenance manual with personnel in full detail to explain all aspects of operations and maintenance.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

**SECTION 01740
WARRANTIES AND BONDS**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Scope of Work:
 - 1. Compile specified warranties and bonds, as in Article 5 and 13 of Section 00700: General Conditions and as specified in these Specifications.
 - 2. Co-execute submittals when so specified.
 - 3. Review submittals to verify compliance with Contract Documents.
 - 4. Submit to the Engineer for review and transmittal to Town.
- B. Related Work Described Elsewhere:
 - 1. Instruction to Bidders: Bid Bonds.
 - 2. Conditions of the Contract: Performance Bond and Payment Bond.
 - 3. Contracting Provisions for Construction Projects: Section 00506.

1.2 SUBMITTAL REQUIREMENTS

- A. Assemble warranties, bonds and service and maintenance contracts executed by each of the respective manufacturers, suppliers, and subcontractors.
- B. Number of original signed copies required: Two (2) each.
- C. Table of Contents: Neatly typed in orderly sequence. Provide complete information for each item.
 - 1. Product of work item.
 - 2. Firm, with name of principal, address and telephone number.
 - 3. Scope.
 - 4. Date of beginning of warranty, bond or service and maintenance contract.
 - 5. Duration of warranty, bond or service maintenance contract.
 - 6. Provide information for Town's personnel:
 - a. Proper procedure in case of failure.
 - b. Instances which might affect the validity of warranty or bond.
 - 7. Contractor information including name of responsible principal, address and telephone number.

1.3 FORM OF SUBMITTALS

- A. Prepare in duplicate packets.
- B. Format:
 - 1. Size 8-1/2 inches by 11 inches, punch sheets for standard three-post binder. Fold larger sheets to fit into binders.
 - 2. Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS". List:
 - a. Title of Project.
 - b. Name of Contractor.
- C. Binders: Commercial quality, three-post binder with durable and cleanable plastic covers and maximum post width of two (2) inches.

1.4 WARRANTY SUBMITTALS REQUIREMENTS

- A. For all major pieces of equipment, submit a warranty from the equipment manufacturer. The manufacturer's warranty period shall be concurrent with the Contractor's for one (1) year, unless otherwise specified, commencing at the time of final acceptance by the Town.
- B. The Contractor shall be responsible for obtaining certificates for equipment warranty for all major equipment specified under Divisions 11: Equipment; 15: Mechanical; and 16: Electrical, and which has at least a 1 Hp motor or which lists for more than \$1,000. The Engineer reserves the right to request warranties for equipment not classified as major. The Contractor shall still warrant equipment not considered to be "major" in the Contractor's one-year warranty period even though certificates of warranty may not be required.
- C. The Town shall incur no labor or equipment costs during the guarantee period.
- D. Guarantee shall cover all necessary labor, equipment and replacement parts resulting from faulty or inadequate design, improper assembly or erection, defective workmanship and materials, leakage, breakage or other failure of all equipment and components furnished by the manufacturer.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

**SECTION 01770
CLOSEOUT PROCEDURES**

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall comply with and be responsible for all the requirements of the Project Manual, without exception.
- B. The Contractor shall comply with applicable requirements in this Section and more specific requirements in Division 1, Section 01100, Summary of Work.
- C. The Contractor shall comply with requirements stated in the Contract and in approved Specifications for the Work.

1.02 RELATED REQUIREMENTS

- A. Conditions of the Contract: Fiscal provisions, legal submittals and additional administrative requirements.
- B. Division 1, General Requirements in the Project Manual.
- C. Closeout submittals required of trades in various sections of the approved Specifications.

1.03 DAMAGES

- A. If the Design/Builder neglects, fails, or refuses to complete the work by the Substantial Completion Date, Final Completion Date, subject to any proper extension granted by the Owner, then the Contractor will pay, or cause the Contractor's Surety to pay damages to the Owner as defined in Summary of the Work, Section 01100.

1.04 SUBSTANTIAL COMPLETION

- A. When Contractor considers the Work is substantially complete, he shall submit to the Owner the following:
 - 1. A written certification that the Work, or designated portion thereof, is substantially complete. All items not complete shall be listed and deficient items noted.
 - 2. Owner will review the Contractor's certification and examine the Work for conformance to the Certification and the Contract Documents.
 - 3. Owner will inform the Contractor of non-compliance or incomplete items.

4. Contractor shall remedy the deficiencies in the Work within seventy-two (72) hours, and send a second written notice of substantial completion to the Owner.
 5. The Owner will re-examine the Work.
- B. When the Owner determines that the Work is substantially complete, the Owner will:
1. Prepare a Certificate of Substantial Completion, accompanied by Contractor's list of items to be completed or corrected, as verified and amended.
 2. Send to Contractor for his/her written acceptance of the responsibilities assigned to them in the Certificate.
- C. After Work is substantially complete, Contractor shall:
1. Obtain and submit Certificate of Occupancy. Owner shall, in detail, list the status of the area affected by partial acceptance and occupancy to establish the existing conditions prior to such acceptance or occupancy.
 2. Complete Work listed for completion or correction within designated form.

1.05 FINAL COMPLETION

- A. Within thirty (30) calendar days after substantial completion, the Contractor shall submit to the Owner written certification that:
1. Contract Documents have been reviewed.
 2. Work has been examined for compliance with Contract Documents.
 3. Work has been completed in accordance with Contract Documents.
 4. Equipment and systems have been tested in the presence of the Owner and the appropriate Utility Operations and Maintenance personnel, and are operational.
 5. Work is completed and ready for final examination.
 6. Submittal of Closeout Documents as stipulated in paragraph 1.06 below.
- B. The Owner will make an examination to verify the status of completion within ten (10) calendar days after receipt of such certification.
- C. Should the Owner consider the Work incomplete or defective, or the Contractor has not demonstrated to the Owner that a "good faith" effort has been made within the time allotted in paragraph 1.05 A above, any Damages and/or Liquidated Damages, will be charged against the Contractor as defined and explained in Section 01100, Summary of Work
1. The Owner will promptly notify the Contractor in writing of all deficiencies listing the incomplete or defective work.

2. Contractor shall take immediate steps to remedy the stated deficiencies, and send a second written Certification to the Owner that the Work is complete.
 3. The Owner will re-examine the Work.
- D. When the Owner concludes that the Work is complete, the Owner shall determine the number of days, if any, for which Liquidated Damages will be assessed and request the Contractor to prepare closeout submittals.
 - E. Acceptance of the entire project shall commence after all contract work is complete, final inspections are made, corrective actions completed, the Work re-inspected, and after final acceptance by the Owner.
 - F. The date established by the Owner as the Final Completion Date shall initiate the guarantee and the warranty periods for all system components and the construction of the Project. The Project shall not be considered Final Complete until all Close Out Documents are properly completed and transmitted to the Owner.
 - G. The Owner shall review the status of the Work and compare it to the request for final payment and compare it with the Project records for conformance to the final settlement requirements.
 - H. The Owner shall receive from the Contractor, and maintain, the permit drawings and specification package (as relevant), copy of all shop drawings and submittals, the “as-built” set of drawings and specifications, maintenance manuals as required by the contract and submitted by the Contractor. In addition, the Contractor shall provide spare parts and supplies, stored materials, special tools, filters, and other pertinent items as required under the Contract Documents to the Owner.

1.06 CLOSEOUT SUBMITTALS

- A. Evidence of compliance with requirements of governing authorities:
 1. Certificate of Occupancy.
 2. Certificates of Inspection:
 - a. Mechanical and Electrical systems as required by the respective sections.
 - b. Sewer main.
 - c. Asphalt Pavement.
 - d. Concrete Pavement.
 3. All Closeout documents required by the Contract Documents.
- B. Project Record Documents, in accordance with Section 01781.
- C. Warranties and Bonds.
- D. Certificate of Insurance for Products and Completed Operations.

1.07 EVIDENCE OF PAYMENTS AND RELEASE OF LIENS

- A. Contractor’s Affidavit of release of Liens.

1. Consent of Surety to Final Payment. Use form acceptable to the Owner.
 2. Contractor's Release or Waiver of Liens. Standard Form "Affidavit and Partial Lien Waiver". Use form acceptable to Owner.
 3. Separate releases of waivers of liens from prime and subcontractors, suppliers and others with lien rights against property of the Owner together with a list of those parties, in accordance with Standard Form "Affidavit and Final Lien Waiver". Use form acceptable to Owner.
- B. All submittals shall be duly executed before delivery to the Owner.

1.08 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit a final Statement of accounting to the Owner.
- B. Statement shall reflect all adjustments to the Contract Sum:
1. The original Contract Sum.
 2. Additions and deductions resulting from:
 - a. Previous Change Orders.
 - b. Allowances.
 - c. Unit Prices.
 - d. Deductions for uncorrected Work.
 - e. Deductions for liquidated damages.
 - f. Other adjustments.
 3. Total Contract Sum, as adjusted.
 4. Previous payments.
 5. Sum remaining due.
- C. The Owner will prepare a final Change Order reflecting approved adjustments to the Contract Sum, which were not previously made by Change Orders.

1.09 FINAL APPLICATION FOR PAYMENT

- A. Contractor shall submit final Application for Payment in accordance with procedures and requirements stated in Division 0.

1.10 ADDITIONAL ADJUSTMENT

- A. No adjustments to the Contract requested by the Contractor will be allowed if asserted after execution of Final Payment of Contract.

1.11 POST-CONSTRUCTION INSPECTION

- A. Prior to expiration of one (1) year from the Date of Final Completion, the Owner, or its designated representative, will make visual inspection of the Project Work in the

company of the Contractor to determine whether further correction of Work is required in accordance with the provisions of the Contract. The Contractor shall be responsible for contacting the Owner and scheduling and coordinating the one (1) year inspection.

- B. The Owner will notify the Contractor, in writing, of any observed deficiencies.
- C. Contractor shall contact the Owner to arrange convenient time and establish schedule for correction of deficiencies.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION 01770

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**SECTION 01781
PROJECT RECORD DOCUMENTS**

PART 1 – GENERAL

1.01 REQUIRED INCLUDED

- A. Contractor shall comply with and be responsible for all requirements of the Project Manual, without exception.
- B. Contractor shall comply with the applicable requirements in this section and more specific requirements in: Section 01100, Summary of Work; and Section 01770, Close Out Procedures.
- C. Contractor shall conform to the requirements of the Owner, Town of Ridgeland, and such other federal, state agencies having jurisdiction.

1.02 RELATED REQUIREMENTS

- A. Division 0, Bidding and Contract Documents, in the Project Manual.
- B. Division 1, General Requirements in the Project Manual.

1.03 MAINTENACE OF DOCUMENTS AND SAMPLES

- A. For duration of Project, maintain at job Site the following:
 - 1. One copy of the Drawings, Specifications, Addenda, shop drawings, products data, miscellaneous requested submittal data, Change Orders and other modifications to Contract, field orders, field test or written instructions.
 - 2. One copy of transmittal letters.
 - 3. One set of construction photographs.
 - 4. One set of samples.
 - 5. One copy of Permit Drawings or documents as may be required by the appropriate governing agency.
- B. Store documents and samples in Contractor's field office, or at an alternate location within thirty (30) minutes travel time, apart from documents used for construction.
 - 1. Provide files and racks for storage of documents.
 - 2. Provide locked cabinets or secure storage space for storage of samples.
- C. File documents and samples in accordance with CSI 16-division format.
- D. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
- E. Make documents and samples available at all times for inspection by the Owner.

- F. Incomplete or out of order documents and samples will be grounds for not approving the Contractor's Application for Payment.
- G. Provide felt tip marking pens for recording information in color code designated by the Owner.
- H. Label each document "PROJECT RECORD" in neat large printed letters. Keep record documents current. Record information concurrently with construction progress. Do not conceal any work until required information is recorded.
 - 1. Drawings: Legibly mark to record actual construction.
 - 2. All underground piping with elevations and dimensions.
 - a. Changes to piping location.
 - b. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - c. Actual installed pipe material, class, etc.
 - d. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.
 - 3. Field changes of dimension and detail.
 - 4. Changes made by Change Order.
 - 5. Details not on original Contract Drawings.
 - 6. Equipment and piping relocations.
 - 7. Specifications and Addenda: Legibly mark each section to record.
 - 8.
 - 9. Manufacturer, trade name, catalog number of Supplier of each product and item of equipment actually installed.
 - 10. Changes made by Change Order.

1.04 RECORD DRAWINGS

- A. Permanent and accurate As-built Record Drawings shall be created at Contractor's expense from the approved, original drawings.
 - 1. The record as-built drawings shall be submitted to the Engineer on Auto-CAD, Release 2016 or latest version, two (2) CD's with signed and sealed digital pdf copies, and two (2) signed and sealed original full size (24"x36") paper copies.
 - 2. Accompany submittal with transmittal letter in duplicate, containing:
 - a. Date.
 - b. Project title and number.
 - c. Contractor's name and address.
 - d. Title and number of each Record Document.
 - e. Signature of Contractor or his authorized representative.
- B. Legibly mark actual construction on designated As-built Record Drawing:
 - 1. Depths of various elements of structure(s).
 - 2. Horizontal and vertical locations of underground utilities and appurtenances referenced to permanent surface improvements.
 - 3. Dimensional locations, vertical and horizontal, of site work, including utilities.

4. Dimensional location, vertical and horizontal, of rehabilitated sewer mains including pipe invert elevations, manhole structures, and top of lid.
 5. Dimensional location and size of sewer service laterals.
- C. Indicate the following installed conditions:
1. Actual installed sewer pipe method of construction.
 2. Field modifications with dimensions and details.
 3. Modifications made by addenda, clarifications, Field Orders or Change Orders.
 4. Details not on original, approved contract drawings.
 5. Record information on a daily basis, or as often as necessary.
 6. Include references to related shop drawings and modifications.
- D. Record data shall be gathered by a Registered Surveyor licensed to conduct work in South Carolina. Reference section 01700 Execution Requirements.
- E. Contractor shall submit As-built Record Documents drawings to the Engineer and Owner for review and acceptance thirty (30) days prior to final closeout.
- F. Make revisions and additions as may be indicated by the Engineer and Owner.
- G. Do not use these Drawings for reference or construction, nor allow them to leave the field office.

1.05 RECORD SPECIFICATIONS AND ADDENDA

- A. Legibly mark up in color code designated by the Owner each Specification Section to record the following:
1. Manufacturer, trade name, catalog name and supplier (with address and phone number) of each product and item of equipment actually installed.
 2. Modifications made by Change Order.
 3. Other matters not originally specified.

1.06 RECORD SAMPLES

- A. Record in transmittal, if not indicated, manufacturer, trade name, catalog number.

1.07 CCTV INSPECTION

- A. Provide copies of all Pre-Construction CCTV and Post Construction CCTV recordings and documentation as required per Section 02955.

1.08 SUBMITTALS

- A. Provide submittals as outlined in the Section 01340 Shop Drawings, Working Drawings, and Samples and in Section 01770 Closeout Procedures. section 4.3 Project Closeout Requirements.

1.09 BURDEN OF ACCURACY

- A. Contractor shall bear all costs of damages of any nature incurred by the Owner due to inaccuracies or incompleteness of the submitted Project Record Documents.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION 01781

END OF

DIVISION 0, BIDDING AND CONTRACT DOCUMENTS

And

DIVISION 1, GENERAL REQUIREMENTS

**SECTION 02140
DEWATERING**

PART 1 – GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The work to be performed under this section shall include furnishing all equipment and labor necessary to remove storm or subsurface waters from excavation areas in accordance with the requirements set forth as shown on the Drawings.
- B. Related Work Described Elsewhere
 - 1. SCDOT Standard Specifications for Highway Construction: Division 200 Earthwork.

1.02 QUALITY ASSURANCE

The dewatering of any excavation area and the disposal of the water shall be in strict accordance with the South Carolina Department of Health and Environmental Control and the latest revision of all local and state government rules and regulations.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 DEWATERING

- A. The Contractor shall provide adequate equipment for the removal of storm or subsurface waters which may accumulate in the excavation. The water table should be maintained at least 2 feet below the required depth of excavation.
- B. If subsurface water is encountered, the Contractor shall utilize suitable equipment to adequately dewater the excavation so that it will be dry for work and pipe laying. A wellpoint system or other Engineer approved dewatering method shall be utilized if necessary to maintain the excavation in a dry condition for preparation of the trench bottom and for pipe laying. The Contractor shall provide a Dewatering Plan prepared by an engineer licensed in the State of South Carolina for submittal and review in accordance with Section 01340.
- C. Dewatering by trench pumping will not be permitted if migration of fine grained natural material from bottom, side walls, or bedding material will occur.
- D. In the event that satisfactory dewatering cannot be accomplished due to subsurface conditions or where dewatering could damage existing structures, the Contractor shall

obtain the Engineer's approval of wet trench construction or procedure before commencing construction.

3.02 DISPOSAL

- A. Water pumped from the trench or other excavation shall be disposed of in storm sewers having adequate capacity, canals, or suitable disposal pits.
- B. Contractor is responsible for acquiring all permits required to discharge the water and shall protect waterways from turbidity during the operation.
- C. In areas where adequate disposal sites are not available, partially backfilled trenches may be used for water disposal only when the Contractor's plan for trench disposal is approved in writing by the Engineer. The Contractor's plan shall include temporary culverts, barricades and other protective measures to prevent damage to property or injury to any person or persons.
- D. No flooding of streets, roadways, driveways, or private property will be permitted. Engines driving dewatering pumps shall be equipped with residential type mufflers. Where practical and feasible, electric "drops" should be used in lieu of portable generators.

END OF SECTION 02140

SECTION 02300

PAVEMENT REMOVAL AND REPLACEMENT

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: Work included under this Section consists of cutting, removing, protecting and replacing existing pavements of the various types encountered.
- B. Protection of Existing Improvements: The Contractor shall be responsible for the protection of all pavements, sidewalks and other improvements within the work area. All damage to such improvements, as a result of the Contractor's operations, beyond the limits of the work of pavement replacement as described herein shall be repaired by the Contractor at his expense.
- C. All paving removal and restoration for this project shall be in accordance with the contract drawings and details, the standards of the South Carolina Department of Transportation (SCDOT), and the project SCDOT Encroachment Permit.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

3.01 TESTING

- A. All compaction density testing shall be conducted by a Geotechnical Professional Engineer licensed in the State of South Carolina. All results shall be submitted to the Owner for review and shall be submitted directly from the testing laboratory to SCDOT (contact information to be provided by Engineer) for construction in SCDOT rights-of-way. Approval must be received from Owner and SCDOT (for construction in SCDOT rights-of-way) prior to paving.

END OF SECTION 02300

SECTION 02640
SEWER SYSTEM CONSTRUCTION

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Scope of Work: Work included under this Section consists of furnishing all labor, equipment and materials necessary for construction of sanitary sewer, sewer connections, manholes, and appurtenances as shown on the Contract Drawings or specified herein. Sewer system rehabilitation requirements are provided in additional Sections.
- B. Section includes:
 - 1. Sewer Pipes.
 - 2. Manholes and Wetwells.
 - 3. Connect to existing system.
 - 4. Forcemain
 - 5. All necessary appurtenances to collect the wastewater and deliver it to the existing system.

1.2 RELATED SECTIONS

- A. Section 02955 – Sewer Line Cleaning and CCTV Inspection.
- B. Section 02960 – Sanitary Sewer Manhole Rehabilitation.
- C. Section 02970 – Sanitary Sewer Cured-in-Place Pipe (CIPP).
- D. Section 02975 – Sanitary Sewer Pipe Bursting.

1.3 OPTIONS

- A. The specifications describe several materials. Where manufacturers and models of equipment are named in the specifications, it is intended these are to describe quality and function required. **Contractor may use equipment or materials of other manufacturers provided they are reviewed and accepted by the Engineer and Owner as equivalent to those specified.**

1.4 REFERENCES (Latest Revision)

- A. ASTM A 615/A 615 M – Deformed and Plain Carbon – Steel Bars for Concrete Reinforcement.
- B. ASTM C 39/C 39M – Compressive Strength of Cylindrical Concrete Specimens.
- C. ASTM C 443 – Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
- D. ASTM C 478 – Circular Precast Reinforced Concrete Manhole Sections.
- E. ASTM C 890 – Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.
- F. ASTM C 891 – Installation of Underground Precast Concrete Utility Structures.
- G. ASTM C 913 – Precast Concrete Water and Wastewater Structures.
- H. ASTM D 714 – Evaluating Degree of Blistering of Paints.
- I. ASTM D–1557 – Laboratory Compaction Characteristics of Soil Using Modified Effort.
- J. ASTM D 2241 – Poly (Vinyl Chloride) (PVC) Pressure–Rated Pipe (SDR Series).
- K. ASTM D 2321 – Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity–Flow Applications.
- L. ASTM D 2774 – Underground Installation of Thermoplastic Pressure Piping.
- M. ASTM D 2794 – Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
- N. ASTM D 3034 – Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- O. ASTM D 3139 – Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
- P. ASTM D 3212 – Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
- Q. ASTM D 3740 – Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- R. ASTM D–6938 – In–Place Density and Water Content of Soil and Soil–Aggregate by Nuclear Methods (Shallow Depth).
- S. ASTM E 96 – Water Vapor Transmission of Materials.
- T. ASTM E 329 – Agencies Engaged in Construction Inspection, Testing, or Special

Inspection.

- U. ASTM F 477 – Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- V. ASTM F 1417 – Installation Acceptance of Plastic Non-Pressure Sewer Lines Using Low-Pressure Air.
- W. ASTM G 154 – Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for UV Exposure of Nonmetallic Materials.
- X. AWWA C 110 – Ductile-Iron and Gray-Iron Fittings
- Y. AWWA C 111 – Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings.
- Z. AWWA C115 – Flanged Ductile Iron Pipe with Ductile Iron or Gray Iron Threaded Flanges.
- AA. AWWA C 150 – Thickness Design of Ductile Iron Pipe.
- BB. AWWA C 151 – Ductile Iron Pipe, Centrifugally Cast, for Water. FF.
- CC. AWWA C 153 – Ductile-Iron Compact Fittings
- DD. AWWA C-500 – Metal-Seated Gate Valves for Water Supply Service.
- EE. AWWA C-509 – Resilient-Seated Gate Valves for Water Supply Service.
- FF. AWWA C 600 – Installation of Ductile Iron Water Mains and their appurtenances.
- GG. AWWA C900 – Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 Inches through 60 inches, for Water Transmission and Distribution.
- HH. ACI 318 – Building Code Requirements for Structural Concrete.

1.5 MEASUREMENT AND PAYMENT

- A. Measurement – Items listed in the proposal shall be considered as sufficient to complete work in accordance with plans and specifications. Any portion of work not listed in the bid form shall be deemed to be a part of item it is associated with and shall be included in costs of unit shown on bid form. Payment for unit shown on the bid form shall be considered satisfactory to cover cost of all labor, material, equipment, and performance of all operations necessary to complete work in place. The unit of measurement shall be unit shown on bid form. Payment shall be based upon the actual quantity multiplied by unit prices. Where work is to be performed at a lump sum price, the lump sum shall include all operations and elements necessary to complete work.
- B. Payment

1. Gravity Sewer Pipe – Measurements will be made between the centers of manholes or to other pipe ends. Payment will be made at the contract unit price per linear foot for each pipe size at various depths of cut. Depths of cut are measured from existing ground unless otherwise noted. Payment will include cost of pipe, plugs, dewatering, excavating all material, testing, backfilling, compaction, cleaning, metal detector tape, tracing wire, and all work necessary to complete the sewer lines.
2. Trench Wall Supports – No separate payment will be made for bracing and sheeting.
3. Manholes (Installation or Removal and Replacement) – Payment for manholes will be made at the unit price for various types and depths. Manhole depths are measured from invert to proposed finish grade unless otherwise noted. Payment shall include cost of excavating, dewatering, constructing manholes in accordance with plans, furnishing and installing a frame and cover, interior and exterior coatings (unless separate pay item included), pipe connectors, backfilling, and compacting material around the manhole. Payment shall also include all removal and proper disposal of existing manholes.
4. Stone Bedding – Will be measured by using the length and depth for which stone is specified by Engineer or Geotechnical Consultant, times a width of four (4) feet wider than outside barrel of pipe. Payment will include cost of removing unsuitable material and furnishing and placing the stone and structural geotextile.
5. Sand Bedding and Backfill– Will be measured by using the length and depth for which sand is specified by Engineer or Geotechnical Consultant, times a width of four (4) feet wider than outside barrel of pipe. Payment will include excavating the unsuitable material below the invert, furnishing, and compacting the (A-3) sand bedding.
6. Service Connection Restoration – Separate payment will be made for service connection restoration to the new gravity sewer main; such costs shall include any necessary fittings and lateral piping to restore connection.
7. Metal Detector Tape – No separate payment will be made for tape. Cost of furnishing and placing metal detector tape shall be included in the contract unit price for installing sewer and force main pipe.
8. Tracer Wire – No separate payment will be made for wire. The cost of furnishing and placing tracer wire shall be included in the contract unit price for installing force main pipe, sanitary sewer, and service laterals.
9. Fittings – Unless otherwise noted, fittings in the system will be included in the lump sum cost of facility improvements. Any fittings items noted in bid form

will be paid for on a per each unit price. All restraints for fittings shall be included in the associated pricing.

10. Force Mains – Unless otherwise noted, forcemain systems will be included in the lump sum cost of facility improvements. Any forcemain items noted in bid form will be paid for on a per linear foot price for the various sizes. Payment will include the pipe, thrust blocking, restrained joints, excavation, backfilling, compaction, testing, grassing, metal detector tape, tracing wire, and clean-up.
11. Plug & Gate Valves – Unless otherwise noted, plug and gate valves will be included in the lump sum cost of facility improvements. Any plug or gate valves items noted in the bid form will be paid on a per each unit price and will include furnishing and installing valve, valve box, backfilling, compacting, grassing, and clean-up.
12. Insert Valves – Unless otherwise noted, insert valves will be included in the lump sum cost of facility improvements. Any insert valve items noted in the bid form will be paid for on a per each unit price and will include furnishing and installing valve, valve box, backfilling, compacting, and cleanup. Any necessary site preparation, foundation, concrete or other supports, or thrust blocks or restraints necessary for installation of the insert valve shall be included in price.
13. Remove and Replace Existing Pavement and Mill and Resurface Pavement – Payment will be made on a unit price per square yard basis for the various items, and in accordance with the Contract Drawings and project permits.
14. Connect to Existing System – No separate payment will be made for connection to existing sewer system. Such payment shall be included in the appropriate structure or gravity sewer construction item and shall include any necessary dewatering, excavation, coring, furnishing and installing flexible sleeve, grouting in pipe, installing and connecting pipe to sleeve, backfilling, compaction, clean-up, and all work necessary to complete the connection.
15. Grassing – There will be no separate measurement or payment. Grassing shall be a subsidiary obligation of Contractor in the restoration of disturbed areas.
16. Wastewater Bypassing Operations – No separate payment will be made for bypassing operations necessary for project sewer construction. Such payment shall be included in the appropriate facility, structure or gravity sewer construction item and shall include any necessary pump, hoses, plugs, piping and fittings, materials, power or fuel, vehicles, and all other equipment and labor necessary to properly bypass wastewater flows for construction. Contractor is responsible for the cost cleanup, monitoring, or regulatory fines of any wastewater spills.

1.6 QUALITY ASSURANCE

- A. Contractor will furnish the Engineer and Owner a description of all material before ordering. Engineer will review the Contractor's submittals and provide in writing an acceptance or rejection of material.
- B. Material and equipment shall be the standard products of a manufacturer who has manufactured them for a minimum of five years and provides published data on their quality and performance.
- C. A subcontractor for any part of the work must have experience on similar work, and if required, furnish Engineer with a list of projects and Owners or Engineers who are familiar with its competence.
- D. If Contractor wishes to furnish devices, equipment, structures, and systems not designed by Engineer, these items shall be designed by either a Professional Engineer registered in the project state or by someone Engineer accepts as qualified. If required, complete design calculations and assumptions shall be furnished to the Engineer or Owner before acceptance.
- E. Testing shall be by a testing laboratory which operates in accordance to ASTM D 3740 or E 329 and shall be acceptable to Engineer prior to engagement. Mill certificates of tests on materials made by manufacturers will be accepted provided the manufacturer maintains an adequate testing laboratory, makes regularly scheduled tests, spot checked by an outside laboratory, and furnishes satisfactory certificates with name of entity making test.
- F. Infiltration and line and grade of sewer shall be made by Contractor with equipment qualified by Engineer and in the presence of Engineer. Engineer or Project Representative reserves the right to accept or reject testing equipment.

1.7 PRODUCT DELIVERY, STORAGE & HANDLING

- A. Material shall be unloaded in a manner avoiding damage and shall be stored where it will be protected and will not be hazardous to traffic. If stored on private property, Contractor shall obtain permission from property owner and shall repair any damage caused by the storage. Material shall be examined before installation. Neither damaged nor deteriorated material shall be used in the work.

1.8 JOB CONDITIONS

- A. Installation of the wastewater collection system must be coordinated with other work on site. Generally, wastewater pipes will be installed first and shall be backfilled and protected so subsequent excavating and backfilling of other utilities does not disturb them. Contractor shall replace or repair any pipe or structure damaged by Contractor's actions at no additional expense to the Owner.

1.9 SEQUENCING AND SCHEDULING

- A. Contractor shall arrange the work so sections of sewers between manholes are backfilled and tested, lateral sewers connected, pavement replaced, and placed in service as soon as reasonable after installation.

1.10 ALTERNATIVES

- A. The intention of these specifications is to produce the best system for the Owner. If the Contractor suggests alternate material, equipment or procedures will improve results at no additional cost, Engineer and Owner will examine suggestion, and if accepted, it may be used. The basis upon which acceptance of an alternate will be given is its value to Owner, and not for Contractor's convenience.

1.11 GUARANTEE

- A. Contractor shall guarantee quality of materials, equipment, and workmanship for 12 months, unless specified otherwise elsewhere, after acceptance of the completed Project. Defects discovered during this period shall be repaired by Contractor at no cost to the Owner.

1.12 EXISTING UTILITIES

- A. All known Town of Ridgeland utility facilities are shown schematically on the construction drawings and are not necessarily accurate in location as to plan or elevation. Utilities such as service lines or unknown facilities not shown will not relieve the Contractor of responsibility under this requirement. Contractor will be held responsible for cost of repairs to damaged underground facilities, even when such facilities are not shown on the drawings.
- B. The Contractor shall call for underground utility locations before starting work. Underground utilities location service can be contacted at (888) 721-7877 (SC) or 811.

1.13 TESTING

- A. Laboratory tests for moisture density relationship for fill materials shall be in accordance with ASTM D 1557, (Modified Proctor).
- B. In place density tests in accordance with ASTM D 2922.
- C. Testing laboratory shall operate in accordance with ASTM D 3740 and E 329 and be acceptable to the Engineer.
- D. Testing laboratory and Project Engineer/Project Representative shall be given a minimum of 48-hours' notice prior to taking any tests.
- E. Testing shall be Contractor's responsibility and shall be performed at the Contractor's expense by a commercial testing laboratory operating in accordance with subparagraph

C above.

- F. Test results shall be furnished to the Engineer prior to continuing with associated or subsequent work.

PART 2 – PRODUCTS

Materials used in the work shall be those named in Bid Form. In multiple type bids, selection of material types will be at the opinion of Owner. Materials and products used shall conform to one of the following:

2.1 SEWER PIPE

- A. PVC Pipe (4”–15” Gravity Sewer) – Shall be polyvinyl chloride plastic (PVC) and shall meet all requirements of ASTM D 3034 SDR 26. All pipe shall be suitable for use as a gravity sewer conduit. Provisions must be made for contraction and expansion at each joint with a rubber gasket. Pipe sizes and dimensions shall be as shown below. All pipe shall be green in color with factory marked homing lines. Fittings shall meet the same specification requirements as pipe.

Nom. Size	Outside Diameter		Min. Wall Thickness
	Average	Tolerance	
4	4.215	± 0.009	.162
6	6.275	± 0.011	.241
8	8.400	± 0.012	.323
10	10.500	± 0.015	.404
12	12.500	± 0.018	.481

Tests on PVC Pipe – Pipe shall be designed to pass all tests at 73 ° F. (+_ 3° F.).

- B. PVC Pipe (16” – 64” Gravity Sewer) – Shall be polyvinyl chloride plastic (PVC) and shall meet all requirements of AWWA C900 with a minimum DR of 18. All pipe shall be suitable for use as a gravity sewer conduit. Provisions must be made for contraction and expansion at each joint with a rubber gasket. Pipe sizes and dimensions shall conform to AWWA C900. All pipe shall be green in color with factory marked homing lines. Fittings shall meet the same specification requirements as pipe.

Tests on PVC Pipe – Pipe shall be designed to pass all tests at 73 ° F. (+_ 3° F.).

2.2 JOINTS – GRAVITY SYSTEM

- A. Joints for PVC Pipe – Shall be integral wall bell and spigot with a rubber ring gasket. Joints shall conform to ASTM D 3212 and gaskets to ASTM F 477.

- B. Jointing PVC to Vitrified Clay Pipe: Unless specifically indicated otherwise, connections of PVC to vitrified clay pipe in the run of the gravity sewer main shall be made with an approved cast coupling.

2.3 MANHOLES AND WETWELLS

- A. Any required conflict manholes shall be provided and constructed in accordance with South Carolina Department of Transportation (SCDOT) standards and as detailed in the Contract Drawings.
- B. Masonry – Shall be new whole brick of good quality laid in masonry mortar or cement mortar made of one part Portland cement and two parts clean sharp sand. Every brick shall be fully bedded in mortar. Manholes and Wetwells shall conform to locations and details shown on the plans.
- C. Precast Concrete – Shall be reinforced concrete constructed in accordance with ASTM C 478 and details shown on the Construction Drawings. Coarse aggregate shall be granite stone. The joints shall be tongue and groove sealed with flexible gaskets or mastic sealant. Gaskets shall be O-Ring or equivalent to Type A or B "Tylox" conforming to ASTM C 443. Mastic shall be equivalent to "Ram- nek" with primer. Primer shall be applied to all contact surfaces of manhole and wetwell joint at the factory in accordance with manufacturer's instructions.
- D. Frames and Covers –
 - 1. Manhole frames and covers shall be gray cast iron conforming to minimum requirements ASTM A48, Class 35, and shall conform in general to the details for each type shown on the plans. Castings shall be of uniform quality, and free from blowholes, porosity, hard spots, shrinkage distortion and other defects. Frames and covers shall be smooth, well-cleaned by shot blasting and shall remain unpainted. All castings shall be manufactured true to pattern, and component parts shall fit together in a satisfactory manner. Frames shall have a clear opening of 22-3/4". There shall be no holes or perforations in the cover. The frame and cover shall have a rubber gasket that is fitted in a machined groove manufactured in the bottom of the cover. All manhole frames and covers shall be traffic bearing unless otherwise specified. Manholes shall be adjustable to changes in final pavement elevation without the use of spaces or rings. Casting patterns shall conform to those shown on the Drawings. Manhole frame and cover shall be as manufactured by U.S. Foundry, Model 680.
 - 2. Wetwell frames and hatches shall be per the requirements listed in Section 11305 and shall include protective grating.
- E. Pipe Connections – Shall have flexible watertight joints at sewer main point of entry into the manhole. The joint shall be an EPDM or polyisoprene sleeve equivalent to "Kor-N-Seal."

F. Coatings – New sanitary sewer manholes and wetwells shall have all interior surfaces coated with cementitious mortar lining.

1. Condition of Manhole or Wetwell to be Coated

- a. Standard Portland cement or new concrete (not quick setting high strength cement) must be well cured prior to application of the protective coating. Generally, 28 days is adequate cure time for standard Portland. If earlier application is desired, compressive or tensile strength of the concrete can be tested to determine if acceptable cure has occurred.
- b. Cementitious patching and repair materials should not be used unless their manufacturer provides information as to its suitability for topcoating with the proposed protective coating. Project specific submittals should be provided including application, cure time and surface preparation procedures which permit optimum bond strength with the protective coating.
- c. Contractor is to maintain strict adherence to applicable NACE and SSPC recommendations with regard to proper surface preparation and compatibility with existing coatings.

2. Repair Materials

- a. Repair materials shall be used to fill voids, structurally reinforce, and/or rebuild surfaces, etc. as determined necessary by Engineer and Contractor prior to application of the protective coating. Repair materials must be compatible with the specified coating and shall be applied in accordance with manufacturer's recommendations.
- b. The following products are acceptable as compatible repair basecoat materials for calcium aluminate topcoating:
 - i. SewperCoat 100% calcium aluminate mortar by Kerneos Aluminate Technologies.

3. Protective coating material shall be:

- a. Calcium aluminate mortar mix designed to withstand long-term exposure to a bacterically corrosive hydrogen sulfide environment. The mortar mix shall only require clean, potable water as an admixture to produce a material suitable for spray application. Mortar mix shall have the following chemical composition:

Al ₂ O ₃	CaO	FeO + Fe ₂ O ₃	SiO ₂
39 – 44%	35 – 39%	9 – 14%	5 – 7%

Design properties of the mortar mix shall be as follows:

Compressive Strength (ASTM C495)	> 7,000 psi	24 hours
	> 9,000 psi	28 days
Flexural Strength (ASTM C293)	> 1,200 psi	24 hours
	> 1,400 psi	28 days
Splitting Tensile Strength (ASTM C496)	> 800 psi	24 hours
Bond Strength/Slant Shear (ASTM C882)	> 1,600 psi	28 days
Shrinkage at 28 days (ASTM C596) Freeze/Thaw after 300 Cycles (ASTM C666)	< 0.06% cured @ 90% relative humidity. No visible damage after 300 cycles	

Mortar mix shall be stored with adequate provisions for the prevention of moisture absorption. It shall be stored in a manner permitting easy access for inspection and identification.

4. Protective Coating Application Equipment – Specifically designed spray equipment, accepted for use by the protective coating manufacturer.

2.4 TEES AND WYES

- A. Gravity sewer tees and wyes shall be four or six inches and same diameter as the run of pipe. They shall be of same material as the sewer main.
- B. Wyes for cleanouts shall be of same material as the lateral pipe.

2.5 LATERALS AND CLEANOUTS

- A. Shall be Polyvinyl Chloride pipe with bells and rubber gaskets for jointing, conforming, to Paragraph 2.1–A, PVC Pipe.
- B. Cleanout Access Box shall be equivalent to U.S. Foundry USF 7623 in pavement or Genova Products 4–inch Schedule 40 PVC–DWV Cleanout Fitting with threaded plug out of pavement.

2.6 FORCEMAIN

- A. P.V.C. – All pipe shall be green in color with factory marked homing lines. Pipe with diameter less than 4 inches shall conform to all requirements of ASTM D 2241, SDR 26, Class 160. Pipe 4 inches through 18 inches shall conform to all requirements of AWWA C900 with CI outside diameter, minimum DR of 18, Pressure Class of 235 p.s.i. Joints shall be in accordance with ASTM D 3139.

- B. Ductile Iron pipe, unless otherwise noted, shall only be used at pump station facility sites as noted on the drawings. Reference Section 11305 for requirements. Push-on-Joints shall be slip-on rubber equivalent to "Fastite," "All-tite," or "Tyton." Flanged joints shall conform to AWWA C 115. Gaskets shall conform to AWWA C 111.
- C. Thrust blocking shall be sized as detailed on the construction drawings details and at the locations noted.
- D. Restrained Joints – Restrained joints for pipe, valves and fittings shall be mechanical joints with ductile iron retainer glands equivalent to “Megalug” or push-on type joints equivalent to "Lok-Ring," "TR Flex," or "Super Lock" and shall have a minimum rated working pressure equal to the item restrained with a minimum safety factor of 2:1. Joints shall be in accordance with the applicable portions of AWWA C–111. Manufacturer of joints shall furnish certification, witnessed by an independent laboratory, stating joints furnished have been tested without signs of leakage or failure. Restrained joints shall be capable of being deflected after assembly.
- E. Fittings:
 - 1. Fittings for Ductile Iron or Plastic Pipe – Shall be ductile iron, manufactured in accordance with AWWA C–153. Fittings shall be Protecto 401 epoxy lined in accordance with AWWA C–104. Fittings shall be designed to accommodate the type of pipe used.
 - 2. Fittings for Flanged Pipe – Shall be manufactured in accordance with AWWA C–110, Class 125 flanges.
 - 3. Fittings for Plastic Pipe – Less than 4 inches shall be PVC with ring tite rubber rming to ASTM D–3139.
 - 4. For pump station facilities, reference construction drawings and Section 11305 for fittings requirements.

2.7 METAL DETECTOR TAPE

- A. Will be installed above all new pipe. Tape shall consist of 0.35 mils thick solid foil core encased in a protective plastic jacket resistant to alkalis, acids, and other destructive elements found in the soil. The lamination bond shall be strong enough so layers cannot be separated by hand. Total composite thickness shall be 5.0 mils. Foil core to be visible from unprinted side to ensure continuity. The tape shall have a minimum 3 inch width and a tensile strength of 35 lbs. per inch.

A continuous warning message indicating “sewer line” repeated every 16 inches to 36 inches shall be imprinted on the tape surface. Tape shall contain an opaque color concentrate designating color code appropriate to the line being buried (Sewer Line – Green)

2.8 TRACER WIRE

- A. Will be used over all new force main, sanitary sewer and service lateral lines. Tracer wire shall be #12 AWG High-Strength Copper Clad Steel (HS-CCS) Conductor, insulated with 30 mil High Density Polyethylene (HDPE) Insulation, and rated for direct burial. Insulation color shall meet APWA color code standards for identification of buried utilities.
- B. Wire connectors shall be designed for direct burial and moisture resistance. Connectors shall be equivalent to 3M DBR/Y-6 Direct Bury Splice Kit.

2.9 GATE VALVES

- A. Two Inches and Larger – Shall be cast iron or ductile iron body, bronze mounted, double disc or resilient wedge design, with non-rising stems, conforming to AWWA C 500, C 509, or C 515. Valves shall have ends to match the pipe to which they are attached. Attachment to plastic pipe shall be made by special adapters. Valves shall have a working pressure of 200 p.s.i. and be tested at 400 p.s.i.

Valves shall be furnished with "O" ring packing. One "O" ring shall be located above the thrust collar and one below. Thrust collar shall be permanently lubricated and have an anti-friction washer on top of the thrust collar.

- B. Smaller than 2 inches – Shall be all brass, ball valve type. The pressure rating shall be 175 p.s.i.
- C. Valve Boxes – Underground valves shall be installed in acceptable valve boxes. Valve boxes shall have a suitable base that does not damage valve or pipe, and shaft extension sections to cover and protect the valve and permit easy access and operation. The box, cover, and extensions shall be cast or ductile iron having a crushing strength of 1,500 pounds per linear foot.

2.10 PLUG VALVES

- A. Shall be fully ported and of the same diameter as pipes to which they are attached. They shall have semi-steel bodies, all metal plugs, stainless steel bearings, and be equivalent to DeZurik 100% port eccentric (PEF) valves or Clow, lever operated. All valves 6 inches and larger shall be equipped with gear actuator and handwheel.

2.11 INSERT VALVES

- A. The insert valve shall be a resilient wedge gate valve designed for use in potable water, raw water, reclaimed water, or sewage systems. The valve shall be installed in an existing pressurized pipeline while maintaining constant pressure and service. The valve shall have a minimum working pressure rating of 150 psi. The valve shall be ductile iron construction meeting ASTM A536 Grade 65-45-12 with a fusion bonded epoxy coating. Hardware shall be stainless steel.

- B. Contractor shall be responsible for installing any thrust blocks or thrust collars as recommended by the insert valve manufacturer or installer.
- C. Insertion valve shall be Insta Valve by Hydra-Stop or Engineer approved equal.

2.12 STONE BEDDING

- A. Shall be graded crushed granite with the following gradation:

Square Opening Size	Percent Passing
1 inch	100%
3/4 inch	90 to 100%
3/8 inch	0 to 65%
No. 4	0 to 25%

2.13 SAND BEDDING AND BACKFILL

- A. Shall be clean sand free from clay and organic material. Not more than 10% shall pass the No. 100 sieve.

2.14 BORROW

- A. Where it is determined sufficient suitable material is not available from the site to satisfactorily backfill pipe to at least two feet above top of pipe, Contractor shall furnish suitable sandy borrow material to accomplish requirements. Material shall not have more than 60% passing the No. 100 sieve, nor more than 20% passing a No. 200 sieve.

2.15 PRODUCT REVIEW

- A. Contractor shall provide the Engineer with a complete description of all products before ordering. Engineer will review all products before they are ordered by Contractor.

PART 3 – EXECUTION

3.1 CONSTRUCTION OBSERVATION

- A. The line, grade, deflection, and infiltration of sewers shall be tested by Contractor under the direction of Engineer. Engineer or Project Representative will have the right to require any portion of work be completed in their presence. If work is covered up after such instruction, it shall be exposed by Contractor for observation. However, if

Contractor notifies Engineer such work is scheduled and Engineer fails to appear within 48 hours, the Contractor may proceed. All work completed and materials furnished shall be subject to review by the Engineer or Project Representative. All improper work shall be reconstructed. All materials not conforming to requirements of specifications shall be removed from the work upon notice being received from Engineer for rejection of such materials. Engineer shall have the right to mark rejected materials to distinguish them as such.

Contractor shall give the Project Engineer or Project Representative a minimum of 48 hours notice for all required observations or tests.

It will also be required by Contractor to keep accurate, legible records of the location of all sanitary lines, service laterals, manholes, force mains, valves, bends, and appurtenances. These records will be prepared in accordance with Section 01781 Project Record Documents. Final payment to the Contractor will be withheld until all such information is received and accepted.

3.2 LOCATION AND GRADE

- A. Line and grade of sewers and position of all manholes and other structures are shown on the drawings. Grade line as given on the profile or mentioned in these specifications means invert or inside bottom of pipe. Price for trenching shall include trench for depth below this line necessary to lay sewer to grade, but measurements for payment will be made only to grade line. Master control lines and bench marks have been provided, as appropriate, by the Engineer. The Contractor shall be responsible for proper locations and grades of sewers.

3.3 SEWER EXCAVATION

- A. Contractor shall perform all excavations of every description and of whatever substance encountered to the depth shown on the plans or specified for all sewers, manholes, and other appurtenances. All excavations shall be properly dewatered before installations are made, by the use of well points, pumping, or other methods accepted by Engineer. Trenches shall be excavated in conformance with the Occupational and Safety Health Administration's (OSHA) Regulations.

Where the character of soil is unsuitable for pipe bedding as determined by Engineer or Geotechnical Consultant, additional excavation will be authorized. Engineer or Geotechnical Consultant shall determine the depth needed for additional bedding and whether material will be sand or stone. The unsuitable material shall be disposed of at Contractor's expense in a proper manner. Bottom of all trenches shall be rounded to conform to the bottom of pipe, to afford full bearing on pipe barrel. Excavation in excess of depths and widths required for sewers, manholes, and other structures shall be corrected by pouring subfoundations of 3,000 p.s.i. concrete and half cradle at the Contractor's expense.

- B. Trenches shall not be excavated more than 400 feet in advance of pipelaying.

3.4 TRENCH WALL SUPPORT

- A. Bracing and Sheeting – The sides of all trenches shall be securely held by stay bracing, or by skeleton or solid sheeting and bracing, as required by soil conditions encountered, to protect adjoining property and for safety. Where shown on drawings or where directed by Engineer, the Contractor must install solid sheeting to protect adjacent property and utilities. Sheeting shall be steel or timber and Contractor shall submit design data, including the section modulus of members and arrangement for bracing at various depths, to Engineer for review before installing sheeting. It shall penetrate at least 3–feet below the pipe invert. Contractor shall ensure support of pipe and its embedment is maintained throughout installation and ensure sheeting is sufficiently tight to prevent washing out of the trench wall from behind sheeting.
- B. Sheeting Removal – Sheeting shall be removed in units and only when backfilling elevation has reached the level necessary to protect pipe, adjoining property, personnel, and utilities. Removal of sheeting or shoring shall be accomplished in a manner to preclude loss of foundation support and embedment materials. Fill voids left on removal of sheeting or shoring and compact all materials to required densities.
- C. Movable Trench Wall Supports – Do not disturb installed pipe and its embedment when using movable trench boxes and shields. Movable supports should not be used below top of pipe zone unless acceptable methods are used for maintaining the integrity of embedment material. Before moving supports, place and compact embedment to sufficient depths to ensure protection of the pipe. As supports are moved, finish placing and compacting embedment.
- D. When sheeting or shoring cannot be safely removed, it shall be left in place. Sheeting left in place shall be cut off at least 2 feet below the surface. No separate payment shall be made for bracing and sheeting except where shown on drawings or authorized by the Engineer.

3.5 LAYING PIPE

- A. All sewer pipe shall be laid upgrade with spigots pointing downgrade and in accordance with ASTM D 2321. The pipe shall be laid in a ditch prepared in accordance with Paragraph 3.3 "Sewer Excavation." When sewer is complete, the interior surface shall conform on bottom accurately to grades and alignment fixed or given by Engineer. Special care shall be taken to provide a firm bedding in good material, select borrow, stone backfill or 3,000 p.s.i. concrete, as authorized, for length of each joint and 1/2 of the circumference. Holes shall be provided to relieve bells from bedding strain, but not so large to allow separation of the bell from barrel by settlement after backfilling. All pipe shall be cleaned out, and left clean. Every third joint shall be filled around immediately after being properly placed.
- B. Jointing – Comply with manufacturer's recommendations for assembly of joint components, lubrication, and making joints. When pipe laying is interrupted, secure

pipng against movement and seal open ends to prevent the entrance of water, mud, or foreign material.

- C. Placing and Compacting Pipe Embedment – Place embedment materials by methods that will not disturb or damage the pipe. Work in and tamp haunching material in area between the bedding and underside of pipe before placing and compacting remainder of embedment in pipe zone. Do not permit compaction equipment to contact and damage the pipe. Use compaction equipment and techniques compatible with materials used and location in the trench. Before using heavy compaction or construction equipment directly over the pipe, place sufficient backfill to prevent damage, excessive deflections, or other disturbance of the pipe.
- D. Rock or Unyielding Materials in Trench Bottom – If ledge rock, hard pan, shale, or other unyielding material, cobbles, rubble, debris, boulders, or stones larger than 1.5–inches are encountered in the trench bottom, excavate a minimum depth of 6–inches below pipe bottom and replace with proper embedment material.
- E. Vertical Risers – Provide support for vertical risers as commonly found at service connections, cleanouts, and drop manholes to preclude vertical or lateral movement. Prevent the direct transfer of thrust due to surface loads and settlement, and ensure adequate support at points of connection to mainlines.
- F. Exposing Pipe for Making Service Line Connections – When excavating for a service line connection, excavate material from above the top of main line before removing material from sides of pipe. Materials and density of service line embedment shall conform to specifications for the main line.
- G. Cleanouts and access boxes shall be installed as shown on the construction drawings. Install concrete collar around access box as shown on detail.
- H. Manhole and Wetwell Connections – Use flexible water stops, resilient connectors, or other flexible systems acceptable to the Engineer making watertight connections to manholes, wetwells, and other structures. Fill annular space between pipe and precast concrete on inside of manhole with non–shrink grout.

Before commencing work within the right–of–way of railroads or South Carolina Department of Transportation, Contractor shall verify Owner has obtained required permits and shall notify appropriate agency in accordance with permit requirements.

3.6 SEPARATION BETWEEN WATER & SANITARY SEWER

- A. Parallel Installation:
 - 1. Water mains shall be laid at least 10 feet horizontally from any existing or proposed sanitary sewer, storm sewer, or sewer manhole. The distance shall be measured edge–to–edge.

2. When conditions prevent a horizontal separation of 10 feet, water main may be laid closer to a sewer (on a case-by-case basis) provided the water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer at such an elevation where bottom of water main is at least 18 inches above top of sewer. It is advised the sewer be constructed of materials and with joints equivalent to water main standards of construction and be pressure tested to assure water-tightness prior to backfilling.

B. Crossing:

1. Water mains crossing house sewers, storm sewers, or sanitary sewers shall be laid to provide a separation of at least 18 inches between the bottom of water main and top of sewer. At crossings, one full length of water pipe shall be located so both joints will be as far from the sewer as possible. Special structural support for the water and sewer pipes may be required.
2. When conditions prevent a vertical separation of 18 inches, the sewer passing over or under water mains shall be constructed of materials and with joints equivalent to water main standards of construction and shall be pressure tested to assure water-tightness prior to backfilling.
3. When water mains cross under sewers, additional measures shall be taken by providing:
 - a. a vertical separation of at least 18 inches between bottom of the sewer and top of water main;
 - b. adequate structural support for sewers to prevent excessive deflection of joints settling on and breaking the water mains;
 - c. length of water pipe be centered at the point of crossing so joints will be equidistant and as far as possible from sewer; and
 - d. both sewer and water main shall be constructed of water pipe and subjected to hydrostatic tests, as prescribed in this document. Encasement of the water pipe in concrete shall also be considered.

3.7 BACKFILLING

- A. All trenches and excavation shall be backfilled immediately after pipes are laid therein, unless other protection of the pipe line is directed. Backfilling material shall be selected and deposited with special reference to the future safety of pipes and in accordance with Contract Drawings and SCDOT Encroachment Permit. Except where special methods of bedding and tamping are provided for, clean earth or sand shall be solidly tamped about pipe up to a level at least 2 feet above top of pipes, and shall be carefully deposited to uniform layers, each layer solidly tamped or rammed with proper tools to not injure or disturb the pipeline. Remainder of the trench backfilling shall be carried on

simultaneously on both sides of pipe in such a manner preventing injurious side pressure. The material used shall be selected from excavations anywhere on site if any of this soil is suitable. Backfill material shall be clean and free of rock, organic and other deleterious matter.

Under traffic areas, backfill material and compaction shall be to SCDOT standards and project Encroachment Permit requirements. In non-traffic areas, the backfill material shall be compacted to a density of not less than 95% of maximum laboratory density at optimum moisture unless otherwise accepted by Engineer. Compaction tests shall be conducted in accordance with ASTM D 6938 by an independent testing laboratory. Tests are to be taken at the direction of Engineer.

Whenever trenches have not been properly backfilled, or if settlement occurs, they shall be refilled, smoothed off and finally made to conform to the ground surface. Backfilling shall be carefully performed, and original surface restored to the full satisfaction of Engineer immediately after installation.

Where thermoplastic (PVC) pipe is installed, Contractor shall take precautions in accordance with ASTM D 2321, during backfilling operations so not to create excessive side pressures, or vertical or horizontal deflection of the pipe nor impair flow capacity.

3.8 **MANHOLES**

- A. Manholes shall be constructed where shown on the drawings or where directed by Engineer. The channel in bottom of manholes shall be smooth and properly rounded. Special care must be exercised in laying the channel and adjacent pipes to grade. Manhole top elevations shall be greater than or equal to the 50-year flood elevation, unless watertight covers are provided. Tops of manholes outside of roads shall be built as noted on Contract Drawings but at a minimum to grades 1-inch above ground surface in developed areas and 6 inches above ground surface in undeveloped areas. Manholes in roads shall be built to grades designated by the Engineer. Manhole sections with either honeycomb defects; exposed reinforcing; broken/fractured tongue or groove; or cracked walls will be subject to rejection by Engineer for use on the project. When mastic sealant is used, improperly applied primer will also be cause for rejection.

No leaks in any manhole will be acceptable. All repairs made from inside the manhole shall be made with mortar composed of one-part Portland cement and two parts clean sand. The mixing liquid shall be straight bonding agent equivalent to "Acryl 60."

3.9 **MANHOLE AND WETWELL PROTECTIVE COATING (CEMENTITIOUS MORTAR LINING)**

- A. Examination

1. All structures to be coated shall be readily accessible to Contractor.
2. Any active flows shall be dammed, plugged, or diverted as required to ensure the liquid flow is maintained below surfaces to be coated. Flows should be totally plugged and/or diverted when coating the invert. All extraneous flows into manhole at or above area coated shall be plugged and/or diverted until coating has set hard to the touch.
3. No leaks may be present prior to commencing and during work.
4. Installation of protective coating shall not commence until the concrete substrate has properly cured in accordance with these specifications.
5. Temperature of the surface to be coated should be maintained between 40 deg F and 120 deg F during application, or as required by coating manufacturer. Prior to and during application, care should be taken to avoid exposure of direct sunlight or other intense heat source to the structure being coated. Where varying surface temperatures do exist, care should be taken to apply coating when the temperature is falling versus rising (i.e. late afternoon into evening vs. morning into afternoon).

B. Surface Preparation

1. All contaminants including: oils, grease, incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, or other contaminants shall be removed.
2. Surface preparation method(s) should be based upon conditions of substrate, service environment and requirements of the protective coating to be applied.
3. All surfaces shall be repaired as required by protective coating system in the intended service condition.
4. Surfaces to receive protective coating shall be cleaned and abraded to produce a sound surface with adequate profile and porosity to provide a strong bond between the protective coating and substrate. Generally, this can be achieved with a high pressure water cleaning using equipment capable of 5,000 psi at 4 gpm. Other methods such as high-pressure water jetting (refer to NACE Standard No. 5/SSPC-SP12), abrasive blasting, shotblasting, grinding, scarifying or acid etching may also be used. Detergent water cleaning and hot water blasting may be necessary to remove oils, grease, or other hydrocarbon residues from the concrete. Whichever method(s) are used, they shall be performed in a manner providing a uniform, sound, clean neutralized surface not excessively damaged. Contractor shall catch debris from cleaning efforts within the manhole. Debris passing into pipelines shall be cleaned at the Contractor's expense.

5. Test prepared surfaces after cleaning but prior to application of protective coating to determine if a specific pH or moisture content of the concrete is required according to manufacturer's recommendations.
6. Area between the manhole and manhole ring and any other area which might exhibit movement or cracking due to expansion and contraction, shall be grouted with a flexible or elastomeric grout or gel. Castings can be abrasive blasted and coated to prevent corrosion if desired.
 - a. Where chimney seal is required in conjunction with the lining, the Contractor shall contact the chimney seal manufacturer to determine the proper preparation required for effectively installing the chimney seal after the coating has been applied and cured.
7. All surfaces shall be checked by Engineer's Representative during and after preparation.

C. Application of Repair Materials

1. Repair materials shall meet the specifications herein. Materials shall be trowel or spray applied utilizing proper equipment onto specified surfaces. Material thickness shall be specified by the Engineer according to Owner's requirements and manufacturer's recommendations.
2. Cementitious repair materials shall be trowelled to provide a smooth surface with an average profile equivalent to coarse sandpaper to optimally receive the protective coating. No bugholes or honeycomb surfaces should remain after the final trowel procedure of repair mortar.
3. The repair materials shall be permitted to cure according to manufacturer recommendations. Curing compounds should not be used unless formulated for compatibility with the specified protective coating.
4. Application of repair materials, if not performed by a coating certified applicator, shall be checked by the protective coating certified applicator to ensure proper finishing for suitability to receive specified coating.
5. After abrasive blast and leak repair is performed, all surfaces shall be checked for remaining laitance prior to protective coating application. Any evidence of remaining contamination or laitance shall be removed by additional abrasive blast, shotblast or other acceptable method. If repair materials are used, refer to these specifications for surface preparation. Areas to be coated must also be prepared in accordance with these specifications after receiving a cementitious repair mortar and prior to application of the protective coating.
6. All surfaces shall be checked during and after preparation and before the protective coating is applied.

D. Application of Protective Coating

1. Application procedures shall conform to recommendations of the protective coating manufacturer, including material handling, mixing, environmental controls during application, safety, and spray equipment.
2. The spray equipment shall be specifically designed to accurately ratio and apply specified protective coating materials and shall be regularly maintained and in proper working order.
3. Protective coating material must be spray applied by a certified applicator of the protective coating manufacturer.
4. Manhole and Wetwell walls, benches, and frame shall be coated by spray application of the protective coating with a uniform thickness. Material shall be applied to bench area to provide for proper drainage. Spray application of calcium aluminate mortar will have a minimum finished thickness of 1/2 inch.
5. Airless spray application equipment acceptable to coating manufacturer shall be used to apply each coat of the protective coating.
6. If necessary, subsequent top-coating or additional coats of the protective coating should occur as recommended by protective coating manufacturer.

E. Testing

1. Visual Inspection – verify no infiltration, cracks, or loose material.
2. Thickness of calcium aluminate will be measured with a ruler while the material is still wet.
3. Measurement of protective coating bond strength to the substrate can be measured in accordance with ASTM D4541. Any areas detected to have inadequate bond strength shall be evaluated by the Engineer. Further bond tests may be performed in failed area to determine the extent of potentially deficient bonded area and repairs shall be made by Applicator in strict accordance with manufacturer's recommendations.
4. Manhole Testing – Type A: Vacuum test. All pipes entering manhole shall be plugged, taking care to securely place plugs from being drawn into the manhole. The test head shall be placed and seal inflated in accordance with manufacturer's recommendations. A vacuum of 10 inches of mercury shall be drawn and the vacuum pump shut off. With the valves closed, time shall be measured for the vacuum to drop to nine (9) inches. Following are minimum allowable test times for manhole acceptance at the specified vacuum drop:

DEPTH (FEET) (Manhole length)	TIME (SECONDS)		
	48-Inch diam.	60-Inch diam	72-Inch diam
4	10	13	16
8	20	26	32
12	30	39	48
16	40	52	64
20	50	65	80
24	60	78	96
Add for 2-feet more depth:	5	6.5	8

Note: These numbers have been taken from ASTM C 924.

If a manhole fails the initial test, repairs and adjustments necessary due to extenuating circumstances (i.e. pipe joint, liner, plug sealing) should be made. Retesting shall proceed until a satisfactory test is obtained.

Manhole Testing – Type B: Exfiltration test. Incoming and outgoing sewer and service lines shall be plugged, plugs restrained and the manhole filled with water to top of manhole frame. A soaking period of up to one hour will be allowed if bypassing of the sewage is not required or has been provided. At the end of this optional soaking period, manhole shall be refilled with water and test begun. If water loss exceeds amount shown in the following table, manhole will have failed test. Repairs and adjustments necessary due to extenuating circumstances (i.e. pipe joint, liner, plug sealing) should be made. Retesting shall proceed until a satisfactory test is obtained. Maximum Allowable Loss is determined assuming a standard 4-foot diameter manhole.

<u>Depth of Manhole</u>	<u>Maximum Allowable Loss</u>
Under 8 feet deep	1 inch in 5 minutes
Over 8 feet deep	1/8 inch per foot of depth in 5 minutes

Limitations and considerations include recognizing exfiltration and vacuum testing may be impractical or cost-prohibitive for all manholes; therefore, use of either method is subject to the following limitations and considerations:

Complete Sealing: These methods are used only when the entire manhole has been sealed or rehabilitated. The lack of sealing or rehabilitation of some portions of manhole may prevent passage of either of these tests. Spot repairs and partial sealing or rehabilitation are therefore subject to infiltration and visual testing only.

Structural Condition: Structural condition of some manholes may be such the testing with these methods is impractical or destructive. The Owner's

Representative and Contractor shall therefore deem as structurally sound, prior to testing using these methods, those manholes which have not been structurally lined.

5. Wetwell Testing: Any wetwell section or lid found to have defects, including but not limited to leaks and cracks shall be removed and replaced. Wetwell leaking joints (infiltration of ground water) will not be accepted. Owner will not accept leak repairs on new construction of wetwells. The leaking wetwell is to be removed and replaced.
6. A final visual observation shall be made by the Engineer and manufacturer's representative. Any deficiencies in the finished coating shall be marked and repaired according to the procedures set forth herein by Manufacturer's Representative.
7. The system may be put back into non-severe operational service as soon as final observation has taken place. However, for severe corrosion duty such as high concentrations of acids, bases or solvents, 3 to 7 days and/or force cure by heat induction to the coated surfaces may be necessary prior to returning to service. Consult coating manufacturer for further details.

3.10 STONE BEDDING

- A. Where, in the Engineer's or Geotechnical Consultant's opinion, subgrade of pipe trench is unsuitable material, Contractor shall remove unsuitable material to a depth determined by Engineer or Geotechnical Consultant and furnish and place stone backfill in trench to stabilize subgrade. Presence of water does not necessarily mean stone backfill is required. If well points or other types of dewatering will remove the water, Contractor shall be required to completely dewater trench in lieu of stone backfill. Stone bedding will be limited to areas where well pointing and other conventional methods of dewatering will not produce a dry bottom.
- B. Stone shall be placed 4 feet wider than the outside diameter of pipe. The pipe shall be carefully bedded in stone as specified, or in accordance with manufacturer's recommendations.

3.11 SAND BEDDING AND BACKFILL

- A. Where, in the Engineer's or Geotechnical Consultant's opinion, character of soil is unsuitable for pipe bedding, even though dewatered, additional depth of excavation as determined by Engineer or Geotechnical Consultant shall be made and replaced with clean sand furnished by Contractor.

3.12 DEFLECTION

- A. It is the Contractor's responsibility to assure backfill is sufficient to limit pipe deflection to no more than 5%. When flexible pipe is used, a deflection test shall be

made by Contractor on the entire length of installed pipeline, not less than 30– days after completion of all backfill and placement of any fill. Deflection shall be determined by use of a deflection device or by use of a spherical, spheroidal, or elliptical ball, a cylinder, or circular sections fused to a common shaft. Ball, cylinder, or circular sections shall have a diameter, or minor diameter as applicable, of 95% the inside pipe diameter. The ball, cylinder, or circular sections shall be of a homogeneous material throughout, shall have a density greater than 1.0 as related to water at 39.2 degrees F, and shall have a surface brinell hardness of not less than 150. The device shall be center bored and through bolted with a 1/4 inch minimum diameter steel shaft having a yield strength of 70,000 p.s.i. or more, with eyes at each end for attaching pulling cables. The eye shall be suitably backed with flange or heavy washer; a pull exerted on opposite end of shaft shall produce compression throughout remote end of ball, cylinder, or circular section. Circular sections shall be spaced so distance from the external faces of front and back sections shall equal or exceed diameter of circular section. Failure of the ball, cylinder, or circular section to pass freely through a pipe run, either by being pulled through by hand or by being flushed through with water, shall be cause for rejection of individual run. When a deflection device is used for the test in lieu of a ball, cylinder, or circular sections described, such device shall be acceptable to Engineer prior to use. Device shall be sensitive to 1.0% of diameter of pipe being measured and shall be accurate to 1.0% of indicated dimension. Installed pipe showing deflections greater than 5% of the normal diameter of pipe shall be retested by a run from opposite direction. If retest also fails, the suspect pipe shall be repaired or replaced at no cost to Owner.

3.13 LEAKAGE

- A. In no stretch of sewer between any two adjoining manholes shall infiltration/exfiltration exceed 25 gallons/day/inch of pipe diameter per mile of pipe. In case leakage exceeds this amount, the sewer shall not be accepted until such repairs and replacements are made to comply with above requirements. Such corrections will be made at the Contractor's expense. All visible leaks shall be repaired, regardless of the amount of leakage.
- B. Lines shall be tested for leakage by low pressure air testing, infiltration tests, or exfiltration tests, as appropriate. Low pressure air testing for PVC pipe shall be as prescribed in ASTM F 1417. Prior to infiltration or exfiltration tests, trench shall be backfilled up to at least the lower half of pipe. If required, sufficient additional backfill shall be placed to prevent pipe movement during testing, leaving the joints uncovered to permit inspection. Visible leaks encountered shall be corrected regardless of leakage test results. When water table is 2 feet or more above top of pipe at the upper end of pipeline section to be tested, infiltration shall be measured using a suitable weir or other device acceptable to Engineer. When Engineer determines infiltration cannot be properly tested, an exfiltration test shall be made by filling the line to be tested with water so a head of at least 2 feet is provided above both water table and top of pipe at upper end of pipeline to be tested. The filled line shall be allowed to stand until pipe has reached its maximum absorption, but not less than 4 hours. After absorption, the head shall be re– established. The amount of water required to maintain this water

level during a 2– hour test period shall be measured. Leakage as measured by either the infiltration test or exfiltration test shall not exceed 25 gallons per inch diameter per mile of pipeline per day. When leakage exceeds the maximum amount specified, satisfactory correction shall be made and retesting accomplished. Testing, correction, and retesting shall be made at no additional cost to the Owner.

- C. Forcemain pressure testing shall be conducted in accordance with the requirements of Section 15045.

3.14 CLEANING AND ACCEPTANCE

- A. Before acceptance of sewer system, it shall be tested and cleaned to the satisfaction of Engineer. Where any obstruction is met, Contractor will be required to clean sewers by means of rod and swabs or other instruments. The pipe line shall be straight and show a uniform grade between manholes. The Engineer shall check lines by lamping or other methods to determine final acceptance.

3.15 CLOSING PIPE

- A. When work or pipe installation is suspended, either for the night or at other times, end of sewer must be closed with a tight cover. Contractor will be held responsible for keeping the sewer free from obstruction.

3.16 PARTIAL ACCEPTANCE OF THE WORK

- A. Owner reserves right to accept and use any part of the work. Engineer shall have power to direct on what line the Contractor shall work and order thereof.

3.17 RECORD DATA

- A. It will be required of the Contractor to keep accurate, legible records, locating all sewers, tees, and laterals. These records will be made available to Engineer for review with each pay application. Final payment to the Contractor will be withheld until all such information is received and accepted.

3.18 REMOVE AND REPLACE PAVEMENT

- A. Pavement shall only be removed after prior written authorization by the Owner. Pavement removed and replaced shall be constructed in accordance with latest specifications of the South Carolina Department of Transportation, the Contract Drawings, and the project SCDOT Encroachment Permit. Traffic shall be maintained and controlled per SCDOT regulations, Contract Drawings, and project Encroachment Permit.

3.19 CONNECT SEWERS TO EXISTING STRUCTURES

- A. Contractor shall connect the system to existing structures where indicated. For brick

structures, a hole not more than 4 inches larger than the outside diameter of new pipe shall be cut neatly in structure, new pipe laid so it is flush with inside face of structure, and annular space around pipe filled with a damp, expanding mortar or grout to make a watertight seal. For precast structures, core proper size hole in structure for pipe being connected, attach flexible sleeve into cored hole and connect new pipe into flexible sleeve with a stainless steel band.

3.20 FIELD QUALITY CONTROL

- A. Soil and density tests shall be made by a testing laboratory acceptable to the Engineer. Laboratory tests of the soil shall be made in accordance with ASTM D 1557. In-place density tests shall be made in accordance with ASTM D 6938. Results of the tests shall be furnished to the Engineer. All tests within SCDOT rights-of-way shall be in compliance with SCDOT requirements.

The minimum number of tests required shall be:

Backfill over sewer in traffic areas.....	1 per 100 linear feet or less for each 4 feet of depth or portion thereof.
Backfill over sewer in non-traffic areas...	1 per 500 linear feet or less for each 6 feet of depth or portion thereof.

3.21 BYPASSING

- A. Bypassing of raw wastewater onto the ground or into a receiving stream is prohibited.

Bypassing shall be accomplished with pumping equipment sufficient to maintain the flow of wastewater. Contractor shall provide pump, hoses, materials, and labor to operate and maintain the bypassing operation. A backup pump shall also be made available by the Contractor. Bypassing operations shall be in accordance with Section 02961 and shall be reviewed and acceptable to the sewer system operator before being implemented.

END OF SECTION 02640

**SECTION 02660
WATER DISTRIBUTION SYSTEM**

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The Contractor shall furnish and install a potable water piping system, complete, tested and ready for operation. The work shall also include such connections, reconnections, temporary service and all other provisions in regard to the existing operation and modification as is required to perform the new work. All references to Industry Standards (ASTM, ANSI, AWWA, etc.) shall be to the latest revision unless otherwise stated. Only those materials included in the Town of Ridgeland Standard Water and Sewer Specifications, details and testing shall be installed. All materials shall be new unless specifically called for otherwise.
- B. Shop Drawing Submittals
- Complete shop drawings, actual catalog data, brochures and descriptive literature will be required and shall meet the requirements of the Town of Ridgeland Water and Sewer Standards. Submittals shall be in accordance with Section 01340: Shop Drawings, Working Drawings, and Samples. The Engineer may at any time require the Contractor to provide a complete detailed shop drawing submittal for any material which may, in the Engineer's opinion, not be in compliance with the Town of Ridgeland Water and Sewer Standards.
1. The Contractor shall submit for the approval of the Engineer four (4) copies, plus as many additional copies as he may need for his files of all shop and setting drawings and schedules required for the work.
 2. The Contractor shall submit all drawings and schedules sufficiently in advance of construction requirements to allow ample time for checking, correcting, resubmitting, and rechecking; no claim by the Contractor for delays arising from his failure in this respect shall be allowed.
 3. All shop drawings submitted must bear the stamp of approval of the Contractor as evidence that the drawings have been checked by the Contractor. Any drawings without this stamp of approval shall not be considered and will be returned to the Contractor for resubmission. If documents vary from the requirements of the Contract Documents because of standard shop practice or other reason, the Contractor shall make mention in such letter of variation in his letter of transmittal in order that, if acceptable, suitable action may be taken for proper adjustment; otherwise, the Contractor shall not be relieved of the responsibility of executing the work in accordance with the Contract Documents even though such shop drawings have been approved.
 4. Where a shop drawing is submitted by the Contractor indicates a departure from the Contract which the Engineer deems to be a minor adjustment in the interest of the Town and which does not involve a change in Contract Price or extension of time, the Engineer will approve the drawings.
 5. The approval by the Engineer of shop drawings will be general and shall not relieve the Contractor from the responsibility for inherent error which may exist.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. All material shall be free from defects impairing strength and durability, shall be of the best commercial quality for the purpose specified, and shall have structural properties sufficient to safely

sustain or withstand strains and stresses to which it is normally subjected and be true to detail.

B. Pipe

Pipe for potable water lines in sizes up to and including 48 inches shall be ductile iron, or polyvinyl chloride (PVC) as shown on the drawings and as herein specified. Pipe for potable water lines larger than 48 inches shall be ductile iron. Pipe to be used as a casing in sizes 4 inches and larger shall be welded steel pipe as shown on the drawings and as herein specified. Pipe to be installed underground shall be push-on joint type. Pipe installed on bridges, piles or other above ground installations shall be restrained joint ductile iron pipe or flanged ductile iron pipe as described in these specifications. PVC pipe shall not be used in above ground applications. Underground pipe shall be furnished in nominal 18 or 20-foot laying lengths unless indicated otherwise on the drawings. Pipe shall be cut to length as required to fit installation conditions. Pipe sizes and applications shall conform to the following chart.

PIPE	PIPE SIZE	JOINT TYPE	APPLICATION
Ductile Iron	3 inches and larger	Mechanical joint, push-on joint, flanged joint, ball joint, etc.	water mains and services-3 inches & 4 inches for services only
PVC DR 14, DR 18	14 inches thru 48 inches	Push-on joint	water mains and services-4 inches for services only
PVC, DR 14, DR 18 (C900)	4 inches thru 12 inches	Mechanical joint, restrained	Water fire mains / lines
SDR 21 PVC	2 inches only	Push-on joint	water mains only
Polyethylene	2 inches and smaller	No joints in pipe	services only
Galvanized	smaller than 3 inches	I.P.T.	flushing valves and contaminated soil sites
Steel	4 inches and larger	Welded	casing only

1. Ductile Iron Pipe

Ductile iron pipe wall thickness and pressure class shall conform to ANSI Specification ANSI A21.50 (AWWA C150) and ANSI A21.51 (AWWA C151) with pressure class 150 as a minimum. Pipe shall also be certified by ISO 9000 by an accredited registrar. Each length shall be clearly marked with the name of the manufacturer, location of the foundry, pressure rating, thickness or pressure class, nominal pipe diameter, weight of pipe without lining and length. All pipe furnished by the manufacturer shall be cast and machined at one foundry location to assure quality control and provide satisfactory test data. All ductile iron pipes shall be externally coated and internally lined as specified in this section. All ductile iron pipe shall be color coded blue by field painting a blue stripe, 3 inches wide, along the crown of the pipe barrel.

2. Polyvinyl Chloride Pressure Pipe

a. Water mains 4" and larger shall be constructed of Polyvinyl Chloride (PVC) pipe with a dimension ratio (DR) of 18 or 14 suitable for a working pressure of 150 PSI at 73.4 F. Pipe shall conform to AWWA Standard C900 for Polyvinyl Chloride Pressure Pipe, 4" through 12" for water distribution, latest edition or revision. Pipe shall be manufactured to cast iron equivalent diameters. PVC DR 25 pipe shall conform to AWWA Standard

C905 for 16 inch pipe. Pipe is to be manufactured to ductile iron pipe equivalent outside diameters.

- b. Water mains and fittings smaller than 4" shall be Polyvinyl Chloride (PVC) pipe SDR 21 PR 200 and shall conform to ASTM D2241, latest revision. The pipe shall have a gasketed bell with rubber ring conforming to ASTM F477. Fittings for 2" water mains shall be compatible with the type pipe specified except for flushing connections which shall use solvent weld fittings. Pipe for flushing connections shall be Polyvinyl Chloride (PVC) pipe, Schedule 40 and shall conform to ASTM D1785.
- c. Fittings for four inch (4") and larger pipe shall be ductile iron and shall conform to the type of pipe being installed. The fittings shall have a minimum working pressure of 150 psi. Fittings shall be cement lined in accordance with AWWA C104/ANSI A21.4 American National standard for Cement- Mortar Lining for Ductile-Iron pipe and Fittings for Water and shall be furnished with an external asphaltic coating.
- d. Buried Warning and Identification Tape: Polyethylene plastic and metallic core or metallic-faced, acid and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, three inch (3") minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar working. Color and printing shall be permanent, unaffected by moisture or soil.
 - i. Warning Tape Color Codes: Blue (Water Systems)
 - ii. Tape shall be manufactured with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to three feet (3') deep.
- e. Locate Wire: All water mains shall be provided with 12 gauge continuous wire on top of water main. All 12-gauge wiring shall be terminated inside valve boxes or at a maximum of 475' intervals with a minimum of 36 inches excess wiring rolled up inside the valve box.

3. Steel Casing Pipe (N/A THIS PROJECT)

C. Service Lines

1. Polyethylene Tubing

All services 2 inches and smaller shall be polyethylene tubing. Tubing shall be manufactured of PE 3408, High Density Polyethylene (HDPE), in accordance with AWWA C901, ASTM D1248, ASTM D2239, ASTM D2737 and ASTM D302660. The tubing shall have a minimum working pressure of 200 psi. Polyethylene tubing shall be copper tube size SDR9 and shall be colored blue. HDPE pipe shall have ultraviolet (UV) inhibitors for protection against direct sunlight for 4 years. Inserts for polyethylene tubing shall be 316 stainless steel. Tubing shall be approved for use with potable water by the National Sanitation Foundation (NSF-14) and shall be continuously marked at intervals of not more than two feet with the following:

- a. Nominal size
- b. Pressure rating
- c. NSF seal

- d. Manufacturer's name or trademark
- e. Standard dimension ratio
- f. ASTM specification

D. Fittings

Fittings shall have joints that match the type of pipe furnished except as follows or as otherwise specified. Fittings on 2-inch PVC pipe may be PVC with push-on bell type joint or solvent weld. Fittings 3-inches and larger on push-on joint pipe installed underground shall be ductile iron with mechanical joint ends or PVC with restrained push-on bell type joint. Fittings 3 inches and larger installed above ground shall be ductile iron with flanged ends or restrained joints unless shown otherwise on the drawings. Fittings for fire hydrant laterals shall be ductile iron, including tee to lateral.

FITTING MATERIAL	FITTING SIZE	JOINT TYPE
Ductile Iron	3 inches and larger	mechanical joint, flanged joint, ball joint
PVC DR18	4 inch through 12 inch	push on joint; restrained joint
SCH 40	2 inches only	solvent weld
SCH 80	2 inches only	solvent weld, threaded
SDR 21	2 inches only	push on joint
Polyethylene	2 inches only	butt fused, compression joint
Galvanized	2 inches only	I.P.T.

1. Ductile Iron Fittings

Ductile iron fittings shall have a minimum working pressure of 150 psi. Fittings shall conform to ANSI Specification A21.10 (AWWA C110), A21.11 (AWWA C111), A21.15 (AWWA C115) and/or A21.53 (AWWA C153). Fittings shall also be certified by ISO 9000 by an accredited registrar. Compact fittings shall normally be installed. Long body fittings shall be used where the drawings specifically call for long body fittings, where compact fittings are not available, or at the option of the Contractor when the laying length is not controlled by compact fitting patterns. All fittings shall be UL/FM approved and shall conform to NSF Standard 61 as applicable. All fittings furnished by the approved manufacturer shall be cast and machined at one foundry location to assure quality control and provide satisfactory test data. Fittings shall have cast on them the pressure rating, nominal diameter of openings, manufacturer's name, foundry location, plant code and degrees or fraction of the circle. Cast letters and figures shall be on the outside body of the fitting. The Town may require random ductile testing of manufacturer's fittings. All ductile iron fittings shall be externally coated and internally lined as specified in this section.

- a. Ductile iron Integral Restraint Joint (IRJ) fittings in sizes 4" through 12" shall meet or exceed the applicable standards cited in this specification. Fittings shall be manufactured of ductile iron (65.45.12) and shall conform to the material and performance requirements of ANSI/AWWA C153/A21.53. Fittings shall be designed for use on ductile iron pipe conforming to ANSI/AWWA C151/A21.51 and PVC pipe conforming to AWWA C900. All fittings shall be provided with integral restraint joints and have seals conforming to ASTM F 477 and the physical testing requirements of AWWA C111. All fittings shall be internally and externally coated as described in paragraph 2.1F. Assembly of fitting joints shall not require beveling of the plain end of a cut pipe and shall not require the use of jacks or power equipment to force the pipe end past the gasket. Fittings shall be manufactured by (Ebba Iron Restrainers, Uni-

flange, or Mega-lugs.), or engineer approved equal.

2. Polyvinyl Chloride Fittings

Fittings that are 2-inch may be PVC with push-on bell type joint or PVC with solvent weld joints as outlined in chart of Section 2.1D. Fittings that are 4 inch and larger shall be restrained push on bell joint. Restraints shall be in accordance with this specification regarding installation and material. The fittings shall conform to the appropriate sections of these specifications for PVC pipe and PVC pipe joints.

a. PVC 1120, Class 150, DR18 Fittings

Fittings shall be PVC injection molded, made from materials meeting or exceeding the requirements of cell class 12454-B material as defined in ASTM D1784. All PVC fittings must comply with, or exceed, AWWA C907. All fittings must be designed to the pressure class of DR18, with a pressure rating of 150 psi and a 2.5 to 1 factor of safety. Virgin materials only shall be used in the manufacture of PVC pressure fittings. These fittings must have UL-FM approval and shall comply with or exceed all ASTM Standards for PVC fittings. All fittings must have NSF-61 approval. The elastomeric gasket shall comply with the requirements specified in ASTM F477 and shall be attached to the bell utilizing glue (AWWA and manufacturer approved type) or rieber ring.

b. PVC 1120, SDR 21, Fittings

SDR 21 fittings shall be injection molded, push on bell type with electrometric rubber seals in accordance with ASTM D3139. Seals shall conform to ASTM F477.

c. PVC 1120, Schedule 40 And Schedule 80 Fittings

Schedule 40 and schedule 80 fittings shall have solvent weld joints and shall be in accordance with ASTM D2672.

d. Polyethylene Fittings

All polyethylene fittings shall comply with NSF-14 requirements. All fittings and couplings shall be thermoplastic nylon 6/6 material suitable for working pressure of 200 psi. Joints on all thermoplastic fittings shall be compression type with 360-degree restraint or threaded as required for a complete installation.

3. Nonstandard Fittings and Wall Castings (N/A THIS PROJECT)

4. Tapping Sleeves

a. Stainless Steel

Stainless steel tapping sleeves shall be used on 4 inch pipe and larger. Stainless steel tapping sleeves shall be all 304 stainless steel, including flanges, bolts and nuts and shall be rated for 150 psi minimum operating pressure and 200 psi minimum test pressure. The tapping sleeve shall have a pilot flange recessed for tapping per MSS SP-60. The pilot flange shall be pressure rated Class D according to AWWA C207 with 125 pound drilling conforming to ANSI B16. Each sleeve shall be supplied with a flange gasket bonded to the flange. The body gasket shall be a full circle, grid pattern, covering the entire length of the sleeve, cloth reinforced, with attached stainless steel bridge to support the gasket at the lugs. The gasket shall be made of SBR rubber or similar material, compounded for use with water, salt solution, mild acids, bases and sewage. The sleeve shall have a 3/4 inch NPT bronze or stainless steel test plug. All

welds shall conform to ASTM A380 and shall be fully passivated.

- E Joints: Type of joint used shall be approved by the Engineer prior to installation. Joints shall be made in accordance with approved printed instructions of the manufacturer, and shall be absolutely watertight.
1. Mechanical Joints

All jointing materials for mechanical joints shall be provided by the pipe and/or fitting manufacturer. Material assembly and bolting shall be in accordance with ANSI Specification A21.11 (AWWA C111). All glands shall be made of ductile iron only.
 2. Push-On Joints
 - a. Ductile Iron

Push-on joints shall be in accordance with ANSI Specification A21.11 (AWWA C111). All joint material shall be provided by the pipe manufacturer and installation shall be in accordance with the manufacturer's recommended practice.
 - b. Polyvinyl Chloride (PVC)

PVC pipe joints shall be the manufacturer's standard push-on bell type with rubber sealing ring in accordance with ASTM D3139. Electrometric gaskets shall conform to ASTM F477.
 3. Ball and Socket Joints (N/A THIS PROJECT)
 4. Flanged Joints

Ductile iron flanged joints shall conform to ANSI A21.10 (AWWA C110) and ANSI A21.15 (AWWA C115). Flanges shall be in accordance with ANSI Specification B16.1, Class 125 with any special drilling and tapping as required to insure correct alignment and bolting. Screwed flanges shall be screwed in tight at the foundry by machine before they are faced and drilled. Flanges for flanged joints and flanged specials shall be integrally cast at right angles to the axis, accurately faced, and drilled smooth and true. Gaskets shall be rubber ring type, cloth inserted, minimum thickness of 1/8 inch and shall be used on all flanges. The entire gasket, including the retainer and sealing ring, shall be one continuous piece. Retainers glued together will not be accepted. Flanged joints shall be made with bolts, bolt studs with a nut on each end, or studs with nuts where the flange is tapped. The number and size of bolts shall conform to the same ANSI standard as the flanges. All flange bolts and nuts shall be 316 stainless steel. Bolt studs shall be of the same quality as machine bolts. Bolts shall be tightened so as to distribute evenly the stress in the bolts and bring the pipe in alignment. The Contractor shall provide suitable filling rings where the layout of the flange piping is such as to necessitate their use. In materials, workmanship, facing and drilling, such rings shall conform to ANSI B16.1 Class 125.
 5. Machined Surfaces

Machined surfaces shall be cleaned and coated with a suitable rust preventive coating at the shop immediately after being machined.
 6. Steel Casing Pipe Joints (N/A THISPROJECT)

Steel casing pipe joints shall be electric fusion (arc) welded by operators whose qualifications meet the requirements of the American Welding Society Standard procedures and in conformance with AWWA C206.
 7. Polyvinyl Chloride Solvent Weld Joints

Pipe joints for schedule 40 or schedule 80 pipe shall be solvent weld joints. The solvent cement

shall comply with ASTM D2564. The joint shall be made in accordance with ASTM D2855. The joint shall conform to ASTM D2672.

8. Polyethylene Joints

Polyethylene joints shall be butt-fused, done with polyethylene fittings or brass compression fittings.

9. Restrained Joints

a. Restrainers

The restrainer shall be manufactured of ductile iron and shall meet or exceed all the requirements of ANSI A21.11 (AWWA C111) and ASTM A536. The restrainer system shall provide anchoring of PVC pipe to mechanical joint fittings or bell to spigot PVC pipe joints. Restraints shall provide a full 360 degree contact with sufficient gripping action to secure the clamp to the pipe and be designed so that restraint action is increased as a result of increases in line pressure. The restrainer shall accommodate the full working pressure rating of the pipe plus surge allowance.

b. Retainer Glands

Retainer glands shall be manufactured of ductile iron grade 64-42-10, ASTM A536 or the pre-approved equal and shall be designed to fit standard mechanical joint bells conforming to applicable sections of ANSI A21.10 (AWWA C110), ANSI A21.11 (AWWA C111) and ANSI A21.53 (AWWAC153). The restraining device shall be rated for the full working pressure of the pipe type used including surge allowance and a 2:1 safety factor. Mechanical restraints shall include a restraining mechanism which, when actuated, imparts a wedging action against the pipe, increasing its resistance as the pressure increases. The restraint shall be compatible with the type of joint being installed. The joint deflection shall not exceed 80% of the pipe manufacturer's recommended maximum deflection. Deflection, if necessary shall be made before tightening the set screws. Bolts and set screws shall be tightened alternately, 180 degrees apart, to the torque recommended by the manufacturer. Retainer glands having set screws that make point contact with the pipe without using a pad to disperse point loading shall not be used on PVC pipe. The restraining device shall not damage or lower the working pressure of the pipe installed. Retainer glands shall be either EBBA Iron or Uni-flange.

10. Flange Adapters

Flange adapters shall be ductile iron manufactured to ASTM A536 standards. Bolt circles and bolt holes shall meet ANSI B16.1 for 125 pounds. Adapter flanges shall meet or exceed all test requirements of AWWA C900, ASTM D2241 and ASTM D1599.

11. Pipe Couplings

The Contractor shall furnish and install pipe couplings as required to complete the work. Pipe couplings used to join two pieces of ductile iron pipe or PVC pipe shall be sized to match the outside diameter of the pipeline. Transition couplings shall be used to join pipes of different outside diameters. The coupling sleeve shall be manufactured of ductile iron conforming to ASTM A536 and be coated with 14 mils of epoxy. The bolts shall be manufactured of a metal of high corrosion resistance and shall conform to ANSI 21.11 (AWWA C111). Gaskets shall be wedge-type and manufactured of virgin SBR for water and sewer service. The installation of all couplings shall be in accordance with manufacturer's recommendations. After installation, all coupling surfaces including bolts and nuts shall be coated with an approved coating as specified in this section of these specifications. Couplers and adapters for polyethylene pipe shall be brass conforming to AWWA C800 and shall be female IPT, pack joint or compression nut.

12. Full Circle Repair Clamps

Full circle repair clamps shall have type 304 stainless steel shells, lugs, bolts, nuts and washers as per ASTM A193, A194, A240, or shall have type 304 stainless steel shells per ASTM A240, ductile iron lugs as per ASTM A536, and 304 stainless steel bolts, washers and nuts. Gaskets for both types shall be virgin SBR as per ASTM D2000 for water and sewer service.

F. Corrosion Protection for Ductile Iron Pipe Interior Lining

The interior of all ductile iron pipe, fittings and specials shall be thin cement lined. The lining shall comply with ANSI Standard A21.4 (AWWA C104).

1. Exterior Coating

All ductile iron pipe and fittings except on bridges or as otherwise noted, shall receive an exterior bituminous coating as specified in ANSI A21.51. The finished coating shall be continuous smooth, neither brittle when cold nor sticky when exposed to the sun, and be strongly adherent to the fitting. All bolts, nuts, studs and other uncoated parts of joints for underground installation shall be coated with asphalt or coal-tar prior to backfilling. Pipes crossing under ditches, culverts, rivers, creeks, etc., shall be considered as buried pipe. All ductile iron pipe shall be color coded blue by field painting a blue stripe, 3 inches wide, along the crown of the pipe barrel.

2. Polyethylene Wrap (N/A THISPROJECT)

a. Material

The polyethylene material shall meet or exceed the requirements of AWWA C105 in all respects. The wrap shall be virgin, high density polyethylene, 4 mils thick minimum. The polyethylene wrap shall be white with 2 each, 6 inch wide, continuous blue tapes located at the 2:00 and 10:00 o'clock position on the pipe.

b. Installation

Although not intended to be a water-tight enclosure, the polyethylene shall prevent contact between the pipe and the surrounding backfill. Installation shall be done according to one of the methods described in AWWA C105, subject to approval by the Engineer and the manufacturer.

G. Piping Supports (NOT USED)

1. Casing Spacers (NOT USED)

H. Material Warranty

The manufacturer of materials furnished on the project shall supply to the Town of Ridgeland, a one (1) year unconditional warranty. The warranty shall be limited to the material which shall constitute complete replacement and delivery to the site of materials only to replace defective materials with new materials conforming to the specifications. This warranty is contingent upon determination of failure by a private independent testing laboratory. The testing shall prove that the failure was caused by failure of the material. The testing laboratory shall be selected by and agreed upon by both parties involved. This warranty is in addition to any warranty required for pipe linings herein before specified.

I. Material Testing

The Town of Ridgeland requires all materials furnished to conform to the following standards. The entire product of any manufacturer or of any one part may be rejected when, in the opinion of the Town of Ridgeland, the methods of manufacture fail to secure uniform results acceptable to the requirements of these specifications. Pipe and materials shall be tested in, and for conformity with,

the latest editions of the following:

<u>Item</u>	<u>Specifications</u>
Ductile Iron Pipe and Fittings	ANSI A21.50 (AWWA C150) ANSI A21.51 (AWWA C151) ANSI A21.53 (AWWA C153)
Polyvinyl Chloride Pipe and Fittings	ASTM D1598 ASTM D1599 ASTM D1784 ASTM D1785 ASTM D2122 ASTM D2241 ASTM D2564 ASTM D2672 ASTM D2837 ASTM D2855 ASTM D3139 ASTM F477 AWWA C900 AWWA C905 AWWA C907
Polyethylene Tubing	ASTM D1248 ASTM D2239 ASTM D2737 ASTM D302660 AWWA C901

J. Water Meter Boxes:

Water meter boxes shall be manufactured by GlasMasters Jacksonville, FL. One Inch Water Meter Boxes shall be 11" x 18" in size with Reader Lid 4 x 7, hinged, Part No S1118RN Access Cover. Enclosures shall be flared with mouse holes Part No S111812F2N. One and a half inch or Two Inch Water Meter Boxes shall be 15" x 27" in size with Reader Lid 4 x 7, hinged, Part No S1527RN Access Cover. Enclosures shall be flared with mouse holes Part No S152712F2N. For applications where water meter box is to be placed in the sidewalk or grassed areas Load Rating to be TIER 8. For applications where water meter box is to be placed in a parking area Load Rating to be TIER 15.

PART 3 - EXECUTION

3.1 REFERENCE POINTS AND LAYOUT

- A. The Contractor shall be responsible for setting all grade, lines and levels. The Contractor or Contractor's Surveyor will provide centerline of construction; the engineer will provide a reference benchmark. Any reference points, points of intersection, property corners, or bench marks, which are disturbed during construction, shall be restored by a Land Surveyor registered to practice in the State of South Carolina, and all costs thereof shall be borne by the Contractor. The Contractor shall assume all responsibility for the correctness of the grade and alignment stakes.

3.2 HANDLING AND CUTTING PIPE

- A. Every care shall be taken in handling and laying pipe and fittings to avoid damaging the pipe,

scratching or marring machined surfaces, and abrasion of the pipe coating. Any fitting showing a crack and any fitting or pipe which has received a severe blow that may have caused an incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work. In any pipe showing a distinct crack in which it is believed there is no incipient fracture beyond the limits of the visible crack, the cracked portion, if so approved by the Town of Ridgeland, may be cut off before the pipe is laid so that the pipe used shall be perfectly sound. The cut shall be made in the sound barrel at a point at least 12 inches from the visible limits of the crack. Except as otherwise approved, all cutting shall be done with a power driven cut off saw. All cut ends shall be examined for possible cracks caused by cutting.

3.3 PIPE INSTALLATION

A. General Requirements

Water mains shall be constructed of the materials specified and as shown on the drawings. All PVC C900/C905 pipe shall be laid in accordance with AWWA C605. Pipe and fittings shall be carefully handled to avoid damage, and if feasible, while they are suspended over the trench before lowering, they shall be inspected for defects and to detect cracks. Defective, damaged or unsound pipe or fittings shall be rejected. Each section of the pipe shall rest upon the pipe bed for the full length of its barrel, with recesses excavated to accommodate bells and joints. Any pipe which has its grade or joint disturbed after laying shall be taken up and re-laid. All precautions shall be taken to prevent sand or other foreign material from entering the pipe during installation. If necessary, a heavy, tightly woven canvas bag of suitable size shall be placed over each end of the pipe before lowering into the trench and left there until the connection is made to the adjacent pipe. Any time the pipe installation is not in progress, the open ends of pipe shall be closed by a watertight plug or other method approved by the Engineer. Plugs shall remain in pipe ends until all water is removed from the trench. Any sand or foreign material that enters the pipe shall be removed from the pipe immediately. No pipe shall be installed when trench conditions (standing water, excess mud, etc.) or the weather (rain, etc.) is unsuitable for such work, except by permission of the Engineer. Any section of pipe already laid which is found to be defective or damaged shall be replaced with new pipe.

B. Pipe Cover

The cover over all piping shall be a minimum of 30 inches in unpaved areas and 36 inches in paved areas with a maximum of 60 inches unless specifically approved otherwise. Cover for pipe under pavement shall be measured from the finished grade. Any reduction in pipe cover will require approval from the Town of Ridgeland and the Engineer. Greater depths will be permitted where required to miss obstructions only. Lines shall be located as shown on the drawings. The Contractor shall investigate well in advance of pipe laying any conflicts which may require readjustments in planned locations and advise the Engineer of the results of these investigations so that the Engineer may give instructions as to the modifications required. Refer to Section 02200 for backfill and compaction requirements.

C. Installation of Iron Piping

All iron pipe and fittings shall be laid in accordance with the pipe manufacturer's recommendations and the American Water Works Association Specification AWWA C600.

D. Thrust Restraint

1. All non-flanged fittings and valves shall be restrained using one of the following methods:

- a. Mechanical restraint at fittings and valves and mechanical restraint along adjacent joints of pipe to a length as specified in the following table.

All Mechanical Joint Fittings must be restrained using either EBBA Iron Restrainers, Uni-flange, or Mega-lugs. Rod restraints will be approved on an individual basis only.

No thrust blocks will be used without prior approval of Town of Ridgeland Public Works Department.

CHART "F"

MINIMUM LENGTH TO BE RESTRAINED ON EACH SIDE OF FITTING (FEET)									
NOMINAL PIPE SIZE (INCHES)	11 1/4° Horizontal Elbow	22 1/2° Horizontal Elbow	45° Horizontal Elbow	90° Horizontal Elbow	Horizontal Tees	Horizontal Plugs and Valves	45° Vertical Offset Upper length/low per length	22½° Vertical Offset Upper length/lower length	Reducer (to 1 size smaller) Length on Larger Size Side
4	2	4	8	20	20 - run 1 - branch	50	20/3	8 / 1	n/a
6	2	5	10	28	20 - run 1 - branch	70	28/4	11 / 2	28
8	3	6	14	36	20 - run 1 - branch	90	36/5	14 / 3	30
10	4	8	18	40	20 - run 1 - branch	110	45/6	17 / 3	29
12	4	9	20	50	20 - run 1 - branch	120	52/8	20 / 4	50
14	5	10	23	56	20 - run 10 - branch	140	60/9	23 / 4	30
16	6	11	26	60	20 - run 26 - branch	160	67/10	26 / 5	30
18	6	12	29	69	20 - run 41 - branch	180	74/12	29 / 5	29
20	7	13	32	75	20 - run 55 - branch	195	80/13	36 / 6	29
24	7	15	33	76	20 - run 58 - branch	200	81/14	37 / 7	55
30	9	18	36	88	20 - run 77 - branch	235	97/16	44 / 8	77
36	10	20	40	100	20 - run 115 - branch	270	110/20	51 / 10	77

NOTE: Table assumptions: PVC pipe, Safety Factor = 1.5, Soil = GM or SM, 3 ft. bury depth to top of pipe, trench type 3, branch on tee is one size smaller than run of tee size and 20 feet of pipe is installed past the tee on the run side (smaller branch sizes must be calculated by the engineer). Vertical offsets are 3 feet deep on top and 8 feet deep on bottom. Reducers are calculated for one size reduction. Test pressure of 150 psi.

The use of thrust blocks shall be limited to situations such as point repair where exposing several joints of pipe is not feasible due to existing ground conditions and also must be used with mechanical

joint restraining devices when, in the judgment of the Engineer, the nature and criticality of an installation is such as to require positive assurance of stability. Concrete collars with tie rods may be used on dead end lines at the Contractor's discretion.

Concrete used for this purpose shall be 2,500 psi minimum. When applicable, schedule and details for the required thrust blocks are included on the drawings. The use of thrust blocks will only be approved by the Town of Ridgeland for special conditions.

2. Joint Restraints within Carrier Pipe (N/A THIS PROJECT)
 3. Casing Spacer Installation (N/A THISPROJECT)
- E. Water Main and Non-Water Main Separation Requirements
1. Separation of Water Mains and Sewers shall conform to the requirements of South Carolina DHEC State Primary Drinking Water Regulations 61-58, Finished Water Pumping, Storage and Distribution Facilities section D. Distribution Systems (12).
 - (a) Parallel installation - Water mains shall be laid at least ten (10) feet horizontally from any existing or proposed sewer. The distance shall be measured edge to edge. In cases where it is not practical to maintain a ten foot separation, the Department may allow deviation on a case-by-case basis, if supported by data from the design engineer. Such deviation may allow installation of the water main closer to a sewer, provided that the water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer at such an elevation that the bottom of the water main is at least eighteen (18) inches above the top of the sewer.
 - (b) Crossings - Water mains crossing sewers shall be laid to provide a minimum vertical separation of eighteen (18) inches between the outside of the water main and the outside of the sewer. This shall be the case whether the water main is either above or below the sewer line. Whenever possible, the water main shall be located above the sewer line. Where a new water main crosses a new sewer line, a full length of pipe shall be used for both the water main and sewer line and the crossing shall be arranged so that the joints of each line will be as far as possible from the point of crossing and each other. Where a new water main crosses an existing sewer line, one full length of water pipe shall be located so both joints will be as far from the sewer line as possible. Where a water main crosses under a sewer, adequate structural support shall be provided for the sewer line to prevent damage to the water main.
 - (c) Special Conditions - When it is impossible to obtain the distances specified in R.61-58.4(D)(12)(a) and (b) the Department may allow an alternative design. Any alternative design shall:
 - (i) maximize the distances between the water main and sewer line and the joints of each;
 - (ii) use materials which meet the requirements R.61-58.4(D)(1) for the sewer line; and,
 - (iii) allow enough distance to make repairs to one of the lines without damaging the other.
 - (d) Force mains - There shall be at least a ten (10) foot horizontal separation between water mains and sanitary sewer force mains. There shall be an eighteen (18) inch vertical separation at crossing as required in R.61-58.4(D)(12)(a) and (b).

- (e) Sewer manholes - No water pipe shall pass through or come in contact with any part of a sewer manhole. Water lines may come in contact with storm sewers or catch basins if there is no other practical alternative, provided that ductile iron is used, no joints of the water line are within the storm sewer or catch basin and the joints are located as far as possible from the storm sewer or catch basin.
- (f) Drain-fields and Spray-fields - Potable water lines shall not be laid less than twenty-five (25) feet horizontally from any portion of a waste-water tile-field or spray- field, or shall be otherwise protected by the method approved by the Department.

ii.

F. System Connections

All connections and ties to the Town of Ridgeland Water System and transfer of services will be performed by the Contractor under supervision of the Town of Ridgeland's representative.

1. Water Main Connections

Tapped connections in the barrel of a pipe shall be less than the diameter of pipe being tapped except 4 inch pipe which may be tapped with a 4 inch tapping sleeve and valve. No taps shall be made within 5 feet of a joint. When making 2 inch PVC water main connections to water mains, a flexible connection shall be made using 2 inch polyethylene pipe one foot long (minimum). The polyethylene pipe shall tie to the existing water main and then tie to the new 2 inch PVC water main. There shall be a stainless steel nipple between saddle and valve on 2 inch water main connections.

2. Water Service Connections

Water services to be Polyethylene – Orangeburg #4-05110, 3406 or Drisco pipe 3408, 5100 ultra-line. All long and short side water services are to be one inch (1”).

G. Field Testing

1. Disinfection Tests

- a. All water pipe and fittings of whatever size and wherever installed on potable water lines shall be thoroughly disinfected prior to being placed in service. Disinfection shall follow the applicable provisions of the procedure established for the disinfection of water mains as set forth in AWWA Standard C651 entitled "AWWA Standard for Disinfecting Water Mains".

Temporary blow-offs, shall be installed for the purpose of clearing the water main. Blow-offs installed on water mains up to and including 12 inches shall be the same diameter as the water main. Blow-offs installed on 16 inch water mains and larger shall be the next smaller size, in diameter, than the water main being tested. Temporary blow-offs shall be removed and plugged after the main is cleared. The Town of Ridgeland Representative shall be present prior to and during the operation of blow- offs. The main shall be flushed prior to disinfection.

The new water main shall be connected to the existing water main at one point only for flushing purposes (no looping). The new main MUST have a blow off on the end as required previously. After the new main is thoroughly flushed, the open end shall be sealed and restrained and the main shall be thoroughly disinfected as specified.

The contractor may use a separate source of water for flushing purposes. Upon completion of the flushing, the contractor shall proceed with disinfection as specified.

Anytime the new line is reopened (to repair defective joints or pipe, defective fitting or valve) the complete disinfection process shall be repeated.

Once bacteriological clearance (on 2 days of samples) has been approved, the main may be pressure tested against an existing system valve.

No new water main may be put in service until a Certification of Completion has been approved by the South Carolina Department of Health and Environmental Controls (SCDHEC). The contractor must supply to the Engineer SCDHEC acceptable record drawings or As-Builts, accurately depicting installed conditions for the Certification of Completion. The Contractor shall allow time for this process to be completed.

2. Leakage and Pressure Tests

See Section 15045 Pressure Testing

3. Locate Wiring Testing

Installed locate wiring shall be tested by the contractor with an approved testing company using approved equipment. Locate wire testing company must be provided a copy of the As-Builts.

H. Inspection

All pipe and fittings shall be subject to inspection at time of delivery and also in the field just prior to installation. All pipe and fittings which in the opinion of the Engineer do not conform to these specifications will be rejected and shall be removed by the Contractor at the Contractor's expense. An authorized Town of Ridgeland representative must be present for all pressure and leakage testing, connections to the Town's existing lines and the collection of water samples. The Town of Ridgeland representative will pull the water samples and deliver them to the lab.

I. State Highway Crossings

Permits for all work within the right-of-way of a State Highway will be obtained by the Engineer. The Contractor shall, however, verify the existence of the permit before commencing work in this area. All work related to the State Highway crossing shall be in full compliance with the requirements of the South Carolina Department of Transportation permit and in accordance with the South Carolina Department of Transportation Utility Accommodation Guide and standard specifications. Unless otherwise shown on the drawings or specified herein, State Highway crossings shall be made by jacking a steel pipe casing, of the size shown on the drawings and shown in the Town of Ridgeland Standard Details, under the highway at the elevations and locations shown. The water main shall then be placed in the casing with approved casing spacers as specified in this section. All joints within carrier pipe shall be mechanically restrained joints. After inspection, the ends of the casing shall be filled with 2500 psi concrete not less than 8 inches thick.

J. Railroad Crossings (N/A THIS PROJECT)

K. Locate Wiring

Contractor shall furnish and install #12 copper locate wiring and warning tape on all PVC water mains and polyethylene and PVC water services installed. Locate wire on services shall be limited to a continuous loop of wire extending 3 feet along the service from the main. Locate wire must be attached to water mains and services with plastic zipper type ties at each side of bell joint or fitting and at 10-foot intervals along pipeline. Locate wire shall be brought to within 8 inches of grade within a valve box or water meter box flush with finished surface with 36 inches of locate wire rolled up inside box at 475 foot intervals. Locate wire shall be installed in box and along pipeline as detailed in the Town of Ridgeland Standard Details. Locate wire shall be installed in either the 1:00 or 11:00 position on the pipe. Locate wire shall be attached to intersecting ductile iron or galvanized pipeline using a three way splice and brass split ground clamp with wire installed around brass nipple. Locate wiring must have the ability to conduct an electrical current; therefore, the wiring must be continuous

without any breaks in the line spliced as per the Town of Ridgeland Standard Details. Locate wire shall be spliced with the Town of Ridgeland approved wire connectors.

L. New Water Services

New water services shall be furnished and installed in the sizes and locations indicated on the Contract documents. Short services shall be services installed on the same side of the road as the water main. Long services shall be services installed on the opposite side of the road as the water main. Typically water services for Town of Ridgeland projects will be installed by the jack & boring or underground piercing tool method. No open cutting of roadway will be allowed for water services.

M. Renewal and Transfer of Water Service

1. General

Where a new water main is installed or where an existing water main is relocated or replaced, as shown on the drawings or where necessary due to a direct conflict with proposed construction and when approved by the Engineer, the Contractor shall install new piping from the water main to each existing water meter.

2. Service Line Size

Service lines and component parts thereof shall be sized based on the existing meter size as follows:

SINGLE METER SERVICES		
Meter Size	Service & Tap Size	Curb Stop Size
3/4"	1"	1"
1"	1"	1"
1-1/2"	1-1/2"	1-1/2"
2"	2"	2"

N. Contractor Warranty

The Contractor shall supply to the Town of Ridgeland a one (1) year unconditional warranty. The warranty shall include materials and installation and shall constitute complete replacement and delivery to the site of materials and installation of same to replace defective materials or defective workmanship with new materials/workmanship conforming to the specifications.

END OF SECTION

**SECTION 02661
WATER VALVES & APPURTENANCES**

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The Contractor shall furnish, install, joint, and test all gate valves, butterfly valves, check valves and other special valves and appurtenances as shown on the drawings and herein specified. All references to Industry Standards (ASTM, ANSI, AWWA, etc.) shall be to the latest revision unless otherwise stated. Only those materials included in the Town of Ridgeland Water and Sewer Standards, Details and Materials Manual shall be installed. All materials shall be new unless specifically called for otherwise.

1.2 ROTATION OF OPENING

- A. All valves larger than two inches installed within a water system to be the Town of Ridgeland owned shall open by turning to the left or counter-clockwise, when viewed from the stem.

1.3 EXTENSION STEMS

- A. Where extension stems are required substantial, adjustable wall brackets and extension stems shall be furnished and located as directed. Extension stems shall be provided on all buried valves when the operating nut is deeper than 30 inches below the final grade. Sufficient stem extension shall be provided so that the nut will be no more than 30 inches below finished grade.

1.4 PAINTING OF VALVES AND VALVE BOX LIDS

- A. The top side of all water valve box covers shall be painted blue except for gate valves at fire hydrants. Top of valve box covers at fire hydrants shall be painted yellow. Oil based, traffic-rated paint shall be used.

1.5 HYDROSTATIC AND LEAKAGE TEST

- A. The Contractor shall be required to perform a separate hydrostatic/leakage field test on each valve installed to insure it is bubble tight. The duration of this test shall be 15 minutes at 150 psi and conform to AWWA C504. The method of performing this test shall be left up to Contractor with the Engineer's approval. The failure of the valve to perform will result in its removal from the job site and replacement by the Contractor at the contractor's expense.

1.6 LOCATING MARKERS FOR VALVES

- A. A 'V' cut shall be carved in the curb closest/adjacent to a below grade valve. This 'V' cut shall be painted blue.

PART 2 - PRODUCTS

2.1 GATE VALVES

- A. General

Gate valves 3 to 12 inches in diameter shall be designed for 200 psi minimum working pressure. Valves over 12 inches in diameter shall be designed for 150 psi minimum working pressure. When full open,

gate valves shall have a clear waterway equal to the nominal diameter of the pipe. The operating nut or wheel shall have an arrow cast in the metal indicating the direction of opening. Each valve shall have the manufacturer's distinctive marking, pressure rating and year of manufacture cast on the body. Prior to shipment from the factory, each valve shall be tested by applying to it a hydraulic pressure equal to twice the specified working pressure.

B. Buried Valves

Buried gate valves shall be iron body bronze mounted, rubber encapsulated, resilient seat, solid wedge, non-rising stem type with operating nuts and adjustable valve boxes and covers. Operating nuts shall be two inches square. Resilient seat gate valves shall conform to applicable sections of AWWA Standards C509 resilient seat. All gate valves 20 inches or larger must be bevel geared for both horizontal and vertical installations. All valves shall be installed vertically unless additional depth of bury is impossible due to physical obstructions. Gate valves shall open counterclockwise.

C. Above Ground Valves

Gate valves located above ground or inside structures shall be hand wheel operated, non-rising stem type with flanged ends and be of the same general construction as buried valves.

D. Valve Joints

All gate valves shall have mechanical joint ends, flanged ends, or screw joints to fit the pipe run in which they are used, except valves installed on push-on joint pipe shall have mechanical joint ends unless otherwise specified.

2.2 MISCELLANEOUS VALVES AND APPURTENANCES

A. Tapping Valves

1. General

Tapping valves shall be iron body, bronze mounted gate valves, non-rising stem, open left, resilient seat, 2 inch square operating nut, for vertical mounting in approximately level setting on buried water lines. The valve ends shall be mechanical joint for use with ductile iron pipe on one side and standard flanged (Class 125) on the other. Valves shall conform to the applicable section of these specifications.

2. Disinfection of Tapping or Drilling Machine

Prior to tapping a potable water main, the drilling machine's pilot drill, shell cutter and cutter hub shall be sterilized in accordance with the following procedure:

Four gallons of potable water shall be combined with 8 oz. of sodium hypochlorite (household bleach); the pilot drill, shell cutter and cutter hub shall be swabbed until clean or totally immersed in the sterilizing solution and allowed to remain wet at least five minutes before tapping operation commences. It is not necessary to rinse the sterilizing solution from tapping components prior to use.

3. Hydrostatic and Leakage Test

After installing a tapping sleeve and valve, and prior to tapping of a pressurized water main, a hydrostatic and leakage test shall be performed. The test will be conducted by introducing water into tap or test hole located at the neck of the outlet half of the sleeve, on sleeves furnished with

said tap, and with the tapping valve in the closed position. Sleeves shall be provided with a test plug. The sleeve and valve shall be capable of maintaining a test pressure of 150 psi for 30 minutes duration, with no sign of visible leaks. All leaks shall be repaired by removing and replacing defective items with items free of defects, after which the sleeve and valve shall be re-tested. Such repair and re-testing shall be done until the installation passes the specified test. The Contractor shall furnish and install any necessary temporary restraints, gauges, pumps and other incidental and appurtenant items necessary to complete this work, and shall remove same upon completion of the test. A watertight plug shall then be inserted into the testhole.

B. Corporation Stops

All corporation stops to be Ford ball corp. FB 1600 AWWA/cc taper thread inlet by female iron pipe thread outlet or FB1000 ball corp with grip joint, McDonald 4701BT. Corporation stops shall be required on all services regardless of service size.

C. Curb Stop

Curb stops must be either Ford B41-343W-G (3/4' x 1") and B41-344W-G (1") both with grip joints or McDonald 6102 W.T.

Adapters can be Ford C84 series with grip joint or Mueller H-15428.

Separate services to be terminated with a curb stop in meter box one foot (1') off property line and minimum of two feet (2') off side property line. Either Brook #37 with 37H lid, for one inch (1"), Brook #38 with 38H lid for 1½", Brook #65 with 65H for 2", or DPW Model D-1200 for one inch (1") services. When performing pressure tests, curb stops must be capped or plugged and tested in the open position.

D. Ball Valves

Ball valves shall be limited to 3/4 inch through 2 inches in size and shall have cast bronze body, bronze tee head, stem with check, full roundway opening and provisions for locking in a closed position. Ball valves for use with copper services shall have an inlet connection with a flare nut fitting for Type K copper tubing and an outlet connection with female iron pipe thread, or shall have an inlet connection with a compression joint (insert stiffener will be used with plastic service connections) and an outlet connection with female iron pipe thread. Ball valves for use with Schedule 40 PVC pipe shall have an outlet connection with female iron pipe threads and an inlet connection with either a compression joint or female iron pipe threads. The latter will require the use of an approved Schedule 40 PVC Adapter (MIPT X SLIP). Compression joints will require insert stiffeners. Below grade ball valves on water mains must have two inch (2") operating nuts and be installed in standard valve boxes.

E. Service or Tapping Saddle

Water services to be made with service saddle for C.I. or AC to be double strapped JCM 402, Mueller H- 10500, Smith-Blair 313, or Ford 202 and must be CC threads (AWWA) unless otherwise indicated in the contract plans.

Service saddles for PVC C-900 water pipe are Mueller (H-134—series or Ford S90). Taps to existing water mains will be made with an approved stainless steel tapping sleeve and resilient seat tapping valve.

Taps to existing water mains will be made with an approved stainless steel tapping sleeve and resilient seat tapping valve.

2.3 FIRE HYDRANTS

A. General

Fire hydrants shall be 4 ½ inch ductile iron body, fully bronze mounted, for 150 psi working pressure, complying with AWWA Standard C502. Fire hydrants to be Mueller #A421 or #A423, Clow Medallion, or M&H AWWA C-502 style 129 Traffic Model, 4½” main valve size. Unless otherwise stated, all drain holes must be rocked with 57 stone. The inlet connection shall be mechanical joint type, with accessories, for 6 inch ductile iron pipe. The hydrant foot shall be epoxy coated and have integral cast tie-back lugs. The integral shut-off valve shall be compression type opening against water pressure, right hand openings. Valve diameter and general interior design shall be sufficient to provide head loss/flow quantity ratios less than specified in the above cited Standard. The main valve seat and the threaded portion of the hydrant into which it screws shall be bronze. The hydrant barrel drain valve and port shall be bronze. The hydrant barrel drain shall be actuated by operation of the main valve stem. The stem operating threads and thrust bearing shall be sealed by "O" rings, from exposure to moisture and shall be provided with means for lubrication. The hose nozzles shall be bronze with National Standard fire hose coupling screw threads, one 4 inch pumper nozzle and two 2 ½ inch hose nozzles. The hydrant operating nut and nozzle cap nuts shall be 1¼” square. Pipe used for fire hydrant laterals shall be ductile iron Pressure Class 350, or Class 150 DR18 PVC. Tees and bends leading to fire hydrants shall be ductile iron only. The nozzle caps shall be securely chained to the hydrant barrel. The chains shall be free from rust or corrosion and painted to match the color of the hydrant. The hydrants shall be "Traffic" type with a frangible flange or lugs and operating stem section at the ground line. The hydrant shall be painted with the above ground finish color "Traffic Yellow".

B. Installation

Fire hydrants shall be installed at the locations shown on the drawings in accordance with the Town of Ridgeland Standard Details.

C. Independent Valve

Independent valve furnished with each hydrant shall be 6 inch, non-rising stem gate valve with mechanical joint ends in conformance with the sub-section entitled "Gate Valves" of these specifications. Independent valves shall be provided with a cast iron valve box in conformance with the sub-section entitled "Valve Boxes".

D. Hydrostatic and Leakage Test

Hydrostatic and leakage tests shall be conducted in accordance with AWWA C502, Section 5.

2.4 VALVE BOXES

A. General

The Contractor shall furnish, assemble and install a valve box for each buried valve. Each valve box installed in non-paved areas shall be installed with a 24 inch round, 6 inch thick concrete collar with #4 reinforcing bars, poured around the top of the valve box cover. The concrete shall have a minimum strength of 3000 psi. Provide brass identification tag with "Water", valve size and valve type epoxyed or riveted to interior of valve box. Tag shall be 2 inch diameter, 1/8 inch thick brass, located a maximum of 2 inches below the top of the valve box.

B. Valve Boxes

Adjustable valve boxes of suitable length shall be used. Cover shall be marked "Water". The top section

shall be adjustable for elevation and shall be set to allow equal movement above and below finished grade. The base shall be centered over the valve and shall be on line with nut at top of valve stem and the entire assembly shall be plumb. Boxes for paved areas shall be cast iron. Boxes for non-paved areas may be PVC. Cast iron castings shall be manufactured of clean, even grain, gray cast iron conforming to ASTM Designation A48, Class 20B, Gray Iron Castings; and shall be smooth, true to pattern, free from blow holes, sand holes, projections, or other harmful defects and shall be coated with a single thin coat of coal tar epoxy. The cover will not rock after it has been seated in any position in its associated jacket.

C. Debris Cap

Debris caps shall be required in all valve boxes. The debris cap shall be comprised of a hollow member having a cylindrical outer surface, a closure for one end and three point resilient contact pads projecting from the outer surface. One contact pad shall be movable by means of a cam having a low angle of advance whereby external forces applied to the cam via the movable contact pad will not cause rotation of said cam. The cap shall have a flexible skirt providing an outward seal preventing debris from getting past the cap. The cap must withstand without slippage, a minimum vertical force of 50 lbs. at a loading rate of 1.0 inches/minute. The cap shall have retaining prongs to retain a standard locating coil, and shall be capable of installing a standard fitting for "Lock-out/Tag-out" in compliance to all standards and requirements of State and Federal OSHA guidelines.

2.5 METER BOXES

A. Concrete

Where called for on the drawings, concrete meter boxes shall be the type as listed in the Town of Ridgeland Water and Sewer Standards, Details and Materials and shall be installed in accordance with the Town of Ridgeland Water and Sewer Standard Details. Concrete meter boxes will only be allowed in driveway and sidewalk areas.

B. Copolymer

Where called for on the drawings, copolymer meter boxes shall be the type as listed in the Town of Ridgeland Water and Sewer Standards, Details and Materials and shall be installed in accordance with the Town of Ridgeland Water and Sewer Standard Details. Copolymer meter boxes will be used in all grass areas.

2.6 BACKFLOW PREVENTION DEVICES

A. Backflow Preventers for Water Service

1. General: Backflow preventers shall work on the reduced pressure principle. The backflow preventer assembly shall consist of two (2) spring-loaded check valves, automatic differential pressure relief valve, drain valves and shut-off valves. The body material shall be bronze or cast iron for a working pressure of not less than 150 psi, with bronze or stainless steel trim. Drain lines with air gaps shall be provided. Rock type hot box enclosure shall be provided to enclose backflow preventer assembly.
2. Manufacturers:
 - a. Febco, Fresno, CA.
 - b. Hersey, Cleveland, NC.
 - c. Ames, Woodland, CA.
 - d. Watts Regulator Co., N. Andover, MA.

- e. Wilkins, Paso Robles, CA.
- f. Conbraco, Matthews, NC.

2.7 WATER METERS

A. Compound Water Meter

Where called for on the drawings, compound water meters shall be the type as listed in the Town of Ridgeland Water and Sewer Standards, Details and Materials and shall be installed in accordance with the Town of Ridgeland Water and Sewer Standard Details.

B. Turbine Water Meter

Where called for on the drawings, turbine water meters shall be the type as listed in the Town of Ridgeland/ Water and Sewer Standards, Details and Materials and shall be installed in accordance with the Town of Ridgeland Water and Sewer Standard Details.

C. Compact Fireline Water Meters

Where called for on the drawings, compact fireline water meters shall be the type as listed in the Town of Ridgeland Water and Sewer Standards, Details and Materials and shall be installed in accordance with the Town of Ridgeland Water and Sewer Standard Details.

PART 3 - WARRANTY

3.1 MATERIAL WARRANTY

The manufacturer of materials furnished on the project shall supply to the Town of Ridgeland, a one (1) year unconditional warranty. The warranty shall be limited to the material which shall constitute complete replacement and delivery to the site of materials only to replace defective materials with new materials conforming to the specifications. This warranty is contingent upon determination of failure by a private independent testing laboratory. The testing shall prove that the failure was caused by failure of the material. The testing laboratory shall be selected by and agreed upon by both parties involved. This warranty is in addition to any warranty required for pipe linings herein before specified.

3.2 CONTRACTOR WARRANTY

The Contractor shall supply to the Town of Ridgeland one (1) year unconditional warranty. The warranty shall include materials and installation and shall constitute complete replacement and delivery to the site of materials and installation of same to replace defective materials or defective workmanship with new materials/workmanship conforming to the specifications.

END OF SECTION

SECTION 02662
WATER TREATMENT CHEMICAL SYSTEM

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The Contractor shall furnish and install water treatment chemical system equipment systems, complete, tested and ready for operation. The work shall also include such connections, reconnections, temporary service and all other provisions in regard to the existing operation and modification as is required to perform the new work. All references to Industry Standards (ASTM, ANSI, AWWA, etc.) shall be to the latest revision unless otherwise stated. Only those materials included in these specifications and drawings and the Town of Ridgeland Standard Water and Sewer Specifications, details and testing shall be installed. All materials shall be new unless specifically called for otherwise.
- B. Shop Drawing Submittals
- Complete shop drawings, actual catalog data, brochures and descriptive literature will be required and shall meet the requirements of these specifications and the Town of Ridgeland Water and Sewer Standards. Submittals shall be in accordance with Section 01340: Shop Drawings, Working Drawings, and Samples. The Engineer may at any time require the Contractor to provide a complete detailed shop drawing submittal for any material which may, in the Engineer's opinion, not be in compliance with these specifications and the Town of Ridgeland Water and Sewer Standards.
1. The Contractor shall submit for the approval of the Engineer four (4) copies, plus as many additional copies as he may need for his files of all shop and setting drawings and schedules required for the work.
 2. The Contractor shall submit all drawings and schedules sufficiently in advance of construction requirements to allow ample time for checking, correcting, resubmitting, and rechecking; no claim by the Contractor for delays arising from his failure in this respect shall be allowed.
 3. All shop drawings submitted must bear the stamp of approval of the Contractor as evidence that the drawings have been checked by the Contractor. Any drawings without this stamp of approval shall not be considered and will be returned to the Contractor for resubmission. If documents vary from the requirements of the Contract Documents because of standard shop practice or other reason, the Contractor shall make mention in such letter of variation in his letter of transmittal in order that, if acceptable, suitable action may be taken for proper adjustment; otherwise, the Contractor shall not be relieved of the responsibility of executing the work in accordance with the Contract Documents even though such shop drawings have been approved.
 4. Where a shop drawing is submitted by the Contractor indicates a departure from the Contract which the Engineer deems to be a minor adjustment in the interest of the Town and which does not involve a change in Contract Price or extension of time, the Engineer will approve the drawings.
 5. The approval by the Engineer of shop drawings will be general and shall not relieve the Contractor from the responsibility for inherent error which may exist.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. All material shall be free from defects impairing strength and durability, shall be of the best commercial quality for the purpose specified, and shall have structural properties sufficient to safely

sustain or withstand strains and stresses to which it is normally subjected and be true to detail.

- B. All equipment and systems shall adhere to the SCDHEC Regulation 61-58 State Primary Drinking Water Regulations and the associated project SCDHEC permit. All materials and coatings in contact with water shall be National Sanitation Foundation NSF 61, NSF 600 and shall have no measurable lead content.
- C. Disinfection System
1. Disinfection system shall utilize skid mounted tablet chlorination system by Arden Industries, Cameron Park, CA or approved equal and shall utilize 90% active tri-chlor tablets. Contact Charlie Northcutt, HM Northcutt Corporation, www.hmnorthcutt.com, 843-884-4952 for information and pricing.
 2. System shall be totally contained system mounted on a skid preplumbed and with all electrical mounted for the equipment. The only exception to mounting is the ChlorVac Assembly which shall be attached at the jobsite.
 3. System shall be Model 22S-200TRI/SKID with equipment sized for the Town of Ridgeland Well #2 (approximate well pump 488 gpm @ 60 psi). System shall include tablet container, control panel with flowmeter, supply pressure gauge, 30 gallon HDPE chlorine solution tank, chlorine solution line, venturi injector and back pressure check valve, water inlet solenoid valve and pressure regulator (if required per manufacturer), float valve.
 4. System shall also include 3 Hp Goulds booster pump model e-SV 3SV11GF4F60 with design condition ~15 gpm @ 326 ft
 5. Reference electrical drawings and specifications (Division 16) for additional requirements.
- D. Metering Pump
1. Diaphragm metering pump and motor shall be provided for phosphate (orthophosphate) dosing system at Well Site #2. System shall have adjustable capacity with a turn-down ratio of 10:1. Pump shall have internal relief valve, ball check valve on both suction and discharge side of pump. Pump shall be epoxy painted, completely assembled on a base plate and have been fully tested. Materials liquid end shall be suitable for use with phosphate. Pump shall be by LutzJesco, LMI Milton Roy, Jaeco Fluid Systems, Inc. or approved equal with capacity of 0 – 4.0 GPH at 100 psi..
 2. Each chemical feed system shall include the following items: Clear PVC calibration column with vent and vented ball valve, pressure relief valve with vented ball for isolation (pressure relief valve shall discharge to pump suction piping), diaphragm protected discharge pressure gauge with vented ball for isolation, pulsation dampener with vented ball valve for isolation, back pressure valve, unions on each side of pump, vented ball valves for suction and discharge piping, wye strainer for suction piping, flushing line with quick connect on suction piping.
- E. Injection quill shall be corrosion resistant retractable injection quill. Length shall be adequately sized based on the potable water pipe. Unions and isolation valves shall be provided to ensure isolation and quill removal. The injection quill shall be easily accessible and fully removable.
- F. Material Warranty
- The manufacturer of materials furnished on the project shall supply to the Town of Ridgeland, a one (1) year unconditional warranty. The warranty shall be limited to the material which shall constitute complete replacement and delivery to the site of materials only to replace defective materials with new materials conforming to the specifications. This warranty is contingent upon determination of

failure by a private independent testing laboratory. The testing shall prove that the failure was caused by failure of the material. The testing laboratory shall be selected by and agreed upon by both parties involved. This warranty is in addition to any warranty required for pipe linings herein before specified.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. All materials and equipment shall be installed as shown on the Drawings and as recommended by the manufacturer.

3.2 INSPECTION AND TESTING

- A. Field Tests: A qualified representative of the equipment system supplier shall inspect the installation and supervise start-up performed by the Contractor's personnel. All components of the system shall be tested for proper operation prior to and during the start-up operation. Representatives shall provide a written report to the Engineer verifying that all their equipment is properly installed and ready to start-up, prior to system start-up.
- B. Maintenance Procedures: After the equipment has been placed into operation, the qualified representative of the equipment system supplier shall instruct the Owner's personnel in proper operating and maintenance procedures without additional cost to the Owner.

END OF SECTION

SECTION 02922
LOAMING, SEEDING AND MULCHING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Scope of Work: The Contractor shall furnish all labor, materials, equipment, and incidentals necessary and place loam finish grade, seed, and maintain all seeded areas as specified herein including all areas disturbed by the Contractor's operations where solid sodding is not specifically required.

1.2 GUARANTEE

- A. All restoration and revegetation work shall be subject to the one (1) year guarantee period of the Contract as specified in the General Conditions of the Contract herein.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Loam (topsoil) shall be fertile, natural soil, typical of the locality, free from large stones, roots, sticks, peat, weeds and sod and obtained from naturally well-drained areas. It shall not be excessively acid or alkaline nor contain toxic material harmful to plant growth. Topsoil stockpiled under other Sections of this Division may be used, but the Contractor shall furnish additional loam at his own expense, if required. All areas disturbed by the Contractor's operations, which are not identified to be sodded shall be seeded as specified herein, in addition to those areas delineated on the plans for seeding.
- B. Fertilizer shall be complete commercial fertilizer, 5-10-10 grade. It shall be delivered to the site in the original unopened containers each showing the manufacturer's guaranteed analysis. Store fertilizer so that when used it shall be dry and free flowing.
- C. Lime shall be ground limestone.
- D. Seed shall be from the same or previous year's crop; each variety of seed shall have a percentage of germination not less than 90, a percentage of purity not less than 85, and shall have not more than one percent weed content.
- E. Seed shall be a Scarified Argentine Bahia applied at a rate of 400 pounds per acre.
- F. Seed shall be delivered in sealed containers bearing the dealer's guaranteed analysis.
- G. Mulch shall be clean small-grain straw.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Loam shall be placed to a minimum depth of 4 inches.
- B. Lime shall be applied at the rate necessary to achieve a pH of 6 to 7.
- C. Fertilizer shall be applied at the rate of 800 pounds per acre.
- D. The subgrade of all areas to be loamed and seeded shall be raked and all rubbish, sticks, roots, and stones larger than 2-inches shall be removed. Loam shall be spread and lightly compacted to finished grade. Compacted loam shall not be less than the depth specified. No loam shall be spread in water or while frozen or muddy.
- E. After the loam is placed and before it is raked to true lines and rolled, limestone shall be spread evenly over loam surface and thoroughly incorporated with loam. Lime shall be added in sufficient quantity to provide a soil pH of 6 to 7.
- F. Fertilizer shall be uniformly spread and immediately mixed with the upper 2-inches of topsoil.
- G. Immediately following this presentation the seed shall be uniformly applied and lightly raked into the surface. Lightly roll the surface and water with fine spray.
- H. All seeded areas shall be mulched with clean small-grain straw at a rate of 1-1/2 to 2 tons per acre. Asphalt emulsion shall be applied uniformly at a rate of 300 gallons per acre to tack the mulch, unless otherwise shown on the plans. Mechanical tacking will be considered on a case-by-case basis as approved by the Engineer.
- I. The Contractor shall keep all seeded areas watered and in good condition, reseeding if and when necessary, until a good, healthy, uniform growth is established over the entire area seeded, and shall maintain these areas in an approved condition until final acceptance of the Contract.
- J. On slopes, the Contractor shall provide against washouts by an approved method. Any washout, which occurs shall be regraded and reseeded at the Contractor's expense until good sod is established.
- K. The Contractor shall maintain the areas in grass in a neat manner by watering, mowing, raking clippings and leaves, and appurtenances until the project is completed.

END OF SECTION 02922

SECTION 02955
SEWER LINE CLEANING AND CCTV INSPECTION

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

- A. Sewer line cleaning will be performed to remove foreign materials from lines and restore the sewer to a minimum of 95% of original carrying capacity or as required for proper seating of internal pipe rehabilitation equipment and materials. The successes of other phases of work depend a great deal on cleanliness of lines. Should Contractor encounter conditions such as broken pipe and major blockages which prevent cleaning from being accomplished or where additional damage would result if cleaning were attempted or continued, the Contractor will not be required to clean those specific pipe sections.
- B. Closed circuit video observation shall be performed on all cleaned pipelines (Pre-Construction) and following sewer system rehabilitation described in other Sections (Post-Construction).
- C. Root Removal from Existing Sewer Lines as determined necessary by Engineer or Owner. Subsequent and successful pipeline rehabilitation at joints depends upon adequate root removal.
- D. Lateral Cuts to Remove Protruding Laterals from Existing Sewer Lines as determined necessary by Engineer or Owner.

1.2 SECTION INCLUDES

- A. Sewer Line Cleaning.
- B. Grease removal.
- C. Debris Removal.
- D. Video Observation and Recording.
- E. Root Removal.
- F. Lateral Cuts.

1.3 RELATED SECTIONS

- A. Section 02640 – Sewer System Construction
- B. Section 02960 – Sanitary Sewer Manhole Rehabilitation

- C. Section 02970 – Sanitary Sewer Cured-in-Place Pipe (CIPP)
- D. Section 02975 – Sanitary Sewer Pipe Bursting

1.4 OPTIONS

- A. The specifications describe several materials. Where manufacturers and models of equipment are named in the specifications, it is intended these are to describe quality and function required. **Contractor may use equipment or materials of other manufacturers provided they are reviewed and accepted by Engineer and Owner as equivalent to those specified.**

1.5 MEASUREMENT AND PAYMENT

- A. Sewer Line Cleaning – Measurements will be made between centers of manholes or to other pipe ends. Payment will be made at the contract unit price per linear foot of sewer pipe cleaned and shall include cleaning pipe and manholes, grease removal, debris removal in manholes, disposal of materials and all necessary materials, labor, tools and equipment, and performance of all operations necessary to complete work.
- B. C.C.T.V. Inspection – Measurements will be made between centers of manholes or to other pipe ends. Payment will be made at the contract unit price per linear foot of sewer pipe video observed and recorded (C.C.T.V.) including all necessary materials, labor, tools and equipment, and performance of all operations necessary to complete work and provide required documentation.
- C. Sewer Line Root Removal – Measurements will be made for tap root removal per each joint. Payment will be made at the contract unit price per sewer joint for tap root removal and shall include all necessary materials, labor, tools and equipment, and performance of all operations necessary to complete root removal and dispose of root material properly. All other non-tap roots shall be removed as necessary and such price shall be included in the unit price for sewer line cleaning.
- D. Lateral Cuts. – Measurements will be made per lateral for lateral cuts to remove protruding lateral pipes from sewer main. Payment will be made at the contract unit price per lateral requiring cutting and shall include all necessary materials, labor, tools and equipment, and performance of all operations necessary to complete lateral cut properly.

1.6 JOB CONDITIONS

- A. Sewer line cleaning, C.C.T.V. inspection, root removal, and lateral cuts must be coordinated with other work on the site. Contractor shall replace or repair any materials or structures damaged through the course of work.
- B. Contractor shall conform to all local, state, and federal regulations including those set forth by OSHA, RCRA and the EPA and any other applicable authorities.
- C. It is the responsibility of the Contractor to determine if field conditions are suitable for the work required, including soil conditions, prior to any cleaning, root removal, lateral

cuts, C.C.T.V. inspection work, or any bypass pumping. Loose soils may be present near access points (including manholes), and it is the responsibility of the Contractor to prevent displacement of these sorts throughout the entire course of the work. In the event of any sinkholes due to Contractor's operations, it is the responsibility of the Contractor to fully repair the area and restore the entire area to its previous condition.

1.7 SEQUENCING AND SCHEDULING

- A. Sewer line cleaning and Pre-Construction CCTV work (if required) must be completed for all project sewer pipe segments prior to performance of any other rehabilitation work on any project sewer pipe, except approved root removal and lateral cuts.
- B. Method statements and design procedures shall be provided to Owner or Engineer by the Contractor when confined space entry, flow diversion, or bypass is necessary.

1.8 ALTERNATIVES

- A. The intention of these specifications is to produce the best system for the Owner. If Contractor suggests alternate material, equipment or procedures will improve results at no additional cost, Engineer and Owner will examine the suggestion and if it is accepted, it may be used. The basis upon which acceptance of an alternate will be given is its value to Owner, and not for convenience of Contractor, prior to commencing any work.

1.9 QUALITY ASSURANCE

- A. Sewer cleaning, root removal, lateral cut, and video observation personnel shall be trained and certified in their field with a minimum of five (5) years' experience specializing in the cleaning and televising of sewers.
- B. Contractor shall provide Owner or Engineer sample video of a previous project showing quality of video produced by equipment being used.

1.10 MAINTENANCE OF TRAFFIC

- A. Traffic shall be maintained and controlled per SCDOT regulations, Contract Drawings, and project Encroachment Permit.

PART 2 – PRODUCTS

2.1 CLEANING EQUIPMENT

- A. Hydraulically Propelled Equipment – Equipment used shall be of a movable dam type and be constructed so a portion of dam may be collapsed at any time during cleaning operation to protect against flooding of the sewer. The movable dam shall be equal in diameter to pipe being cleaned and shall provide a flexible scraper around outer periphery to ensure removal of grease or other material adhered to pipe walls. If sewer cleaning balls or other equipment which cannot be collapsed are used, special

precautions to prevent flooding of the sewers and public or private property shall be taken.

- B. High-Velocity Jet (Hydrocleaning) Equipment – All high-velocity sewer cleaning equipment shall be constructed for ease and safety of operation. The equipment shall have a selection of two or more high-velocity nozzles. The nozzles shall be capable of producing a scouring action from 15 to 45 degrees, in all size lines designated to be cleaned. Equipment shall also include a high-velocity gun for washing and scouring manhole walls and floor. The gun shall be capable of producing flows from a fine spray to a solid stream. The equipment shall carry its own water tank, auxiliary engines, pumps, and hydraulically driven hose reel.
- C. Mechanically Powered Equipment – Bucket machines shall be in pairs with sufficient power to perform the work in an efficient manner. Machines shall be belt operated or have an overload device. Machines with direct drive causing damage to the pipe will not be allowed. A power rodding machine shall be either a sectional or continuous rod type capable of holding a minimum of 750- feet of rod. The rod shall be specifically heat-treated steel. To insure safe operation, the machine shall be fully enclosed and have an automatic safety clutch or relief valve.
- D. Water for cleaning will be provided by the Owner from onsite fire hydrants. Contractor shall provide appropriate equipment, hoses, and backflow prevention for filling the high velocity jet cleaner or in use with other types of cleaning equipment.

2.2 LATERAL CUT EQUIPMENT

- A. Equipment for cutting/grinding the protruding service connection shall be a remote grinding/cutting device capable of removing, concrete, vitrified clay, PVC and other types of pipe material. The device shall be specifically designed to cut/grind protruding service connections. The Contractor shall use remote CCTV equipment to monitor the progress of the work and ensure that the service connection is not damaged.

2.3 VIDEO EQUIPMENT

- A. Pan and tilt color camera providing a 300 degree viewing angle both horizontally and vertically with 360 degree camera head rotation. Camera shall be skid or tractor mounted. Camera shall be mounted so lens is situated in the center of pipe.
- B. Closed circuit color monitor shall be provided to view video of sewer line. Monitor shall be 12-inch minimum.
- C. DVD Video Recorder – Provide two color recordings simultaneously.
- D. Keypad for entering text to on-screen display.
- E. On-screen footage counter.
- F. Audio commentary capability.

- G. DVD disks or flash drives.

PART 3 – EXECUTION

3.1 CLEANING PRECAUTIONS

- A. During sewer cleaning operation, satisfactory precautions shall be taken in the use of cleaning equipment. When hydraulically propelled cleaning tools (which depend upon water pressure to provide their cleaning force) or tools which retard flow in sewer line are used, precautions shall be taken to insure water pressure created does not damage or cause flooding of public or private property being served by the sewer. When possible, flow in the sewer shall be utilized to provide necessary pressure for hydraulic cleaning devices. When additional water from fire hydrants is necessary to avoid delay in normal work procedures, water shall be conserved and not used unnecessarily. No fire hydrant shall be obstructed in case of a fire in area served by the hydrant.

3.2 SEWER LINE CLEANING

- A. The designated sewer pipe sections shall be cleaned using hydraulically propelled, high-velocity jet, or mechanically powered equipment. Selection of the equipment used shall be based on conditions of lines at time work commences. The equipment and methods selected shall be satisfactory to Owner and Engineer. The equipment shall be capable of removing dirt, grease, rocks, sand, and other materials and obstructions from the sewer lines and manholes. If cleaning of an entire section cannot be successfully performed from one manhole, the equipment shall be set up on another manhole and cleaning again attempted. If, again, successful cleaning cannot be performed or the equipment fails to traverse entire manhole section, it will be assumed a major blockage exists and cleaning effort shall be abandoned.
- B. High-velocity jet cleaning nozzles shall be moving at all times when inside a pipeline. The maximum speed during cleaning shall be 30 feet per minute.

3.3 ROOT REMOVAL

- A. Roots shall be removed in designated sections where root intrusion is a problem. Special attention should be used during cleaning operation to assure almost complete removal of roots from the joints. Any roots preventing the seating of rehabilitation equipment and materials shall be removed. Procedures may include the use of mechanical equipment such as rodding machines, bucket machines and winches using root cutters and porcupines, and equipment such as high-velocity jet cleaners.

3.4 LATERAL CUTS

- A. The protruding break-in service connection shall be cut/ground flush to the main sewer pipe without scouring or damaging the main sewer or service connection. All cuttings must be screened, collected, and removed from the sewer for proper disposal.

- B. During the post-cleaning (pre-construction) television inspection, the Contractor shall slowly pan the entire circumference of the trimmed connection to verify the quality of the work.
- C. The Contractor shall immediately notify the Owner and Engineer if he believes that the pipe is not structurally sound. The Contractor and Owner and Engineer shall discuss the severity and risk of cutting/grinding the lateral. The Owner shall then determine, if they want the lateral cut/ground, at the Owners risk, or if the work should not be performed on this contract.
- D. If other than typical lateral materials are encountered, the Contractor shall notify the Owner and Engineer and the Owner, Engineer and Contractor should discuss the ability, costs and risks associated with cutting/grinding the lateral. The Owner shall decide, whether to cut/grind the lateral or to not cut/grind the lateral. If the Owner decides to cut/grind the lateral, the price should be negotiated between the Owner and Contractor, prior to cutting/grinding the lateral.

3.5 DEBRIS REMOVAL

- A. Debris such as dirt, sand, rocks, grease, and other solid or semisolid material resulting from the cleaning operation shall be removed at downstream manhole of section being cleaned. Passing material from manhole section to manhole section, which could cause line stoppages, accumulations of sand in wet wells, or damage pumping equipment, shall not be permitted.

3.6 DISPOSAL OF MATERIALS

- A. The Contractor shall obtain a legal dumpsite for all debris removed from sewers during cleaning operation.

3.7 VIDEO OBSERVATION

- A. After the existing sewer is completely cleaned, internally check with television camera and video recording as required (Pre-Construction). The finished video recording shall be continuous over entire length of sewer between two manholes.
- B. Video observation (C.C.T.V.) of pipelines shall be performed by experienced personnel trained in locating breaks, obstacles, and service connections by closed circuit color television. Video observation shall include the following:
 - 1. Closed circuit video observation shall be performed on all cleaned pipelines (Pre-Construction) and following sewer system rehabilitation described in other Sections (Post-Construction). Recordings and required reports/logs shall be submitted to the Engineer and Owner for approval.
 - 2. Required documentation for all video observation:
 - a. Video files on DVD or flash drive with voice description.

- b. Logs/Report of observation and inspection noting at a minimum segment run with identified upstream and downstream manholes; pipe size and material; direction of observation; station distance of all noted defects, joints, and laterals; description of defects. Logs/reports shall be provided in electronic format (PDF) on DVD or flash drive.
3. Camera shall be centered in pipeline and travel a maximum of 25 feet per minute.
4. On screen footage shall be calibrated with above ground measurements.
5. Video recordings to remain property of the Owner; Contractor to retain second copy for its use.
6. All flows tributary to section of sewer being videoed are to be completely bypassed around the section during observation, if necessary.
7. Should any portion of the video recordings be of inadequate quality or coverage, as determined by Owner or Engineer, Contractor will have the portion videoed and recorded again at no additional expense to Owner.
8. If damaged areas are found in addition to those noted on the contract drawings, Contractor shall notify Owner or Engineer and a decision about repair will be made.
9. Contractor shall utilize Pre-Construction CCTV documentation (video files, logs and reports) to verify existing rehabilitation methods noted on Contract Drawings, or provide recommended alternative rehabilitation methods. Verification or recommended alternative rehabilitation methods shall be presented to Engineer for review and is considered part of the required Pre-Construction CCTV documentation.

3.8 FINAL ACCEPTANCE

- A. Acceptance of sewer line cleaning shall be made upon successful completion of the C.C.T.V observation and shall be to satisfaction of Owner. If video recordings show the cleaning to be unsatisfactory, Contractor shall be required to re-clean and re-video sewer line until cleaning is shown to be satisfactory. If internal pipe rehabilitation is to follow television observation, particular attention should be given to adequacy of cleaning to ensure proper seating of the equipment and materials can be achieved.

END OF SECTION 02955

SECTION 02960
SANITARY SEWER MANHOLE REHABILITATION

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

- A. This section covers all work, materials, equipment and testing required for the rehabilitation of sanitary sewer manholes as part of this project. The contract drawings indicate what type of rehabilitation is required for each manhole.

1.2 SECTION INCLUDES

- A. Manhole Protective Coating (Cementitious Mortar Lining)
- B. Manhole Chemical Grouting (for sealing random or isolated leaks in brick or precast concrete manholes)
- C. Manhole Frame and Chimney Seal – Interior
- D. Manhole Frame and Chimney Seal – Exterior Above Grade
- E. Manhole Invert Repair
- F. HDPE Manhole Insert
- G. Manhole Frame and/or Cover and Adjustment

1.3 RELATED SECTIONS

- A. Section 02640 – Sewer System Construction
- B. Section 02955 – Sewer Line Cleaning and CCTV Inspection
- C. Section 02970 – Sanitary Sewer Cured-in-Place Pipe (CIPP)
- D. Section 02975 – Sanitary Sewer Pipe Bursting

1.4 OPTIONS

- A. The specifications describe several materials. Where manufacturers and models of equipment are named in the specifications, it is intended these are to describe the quality and function required. **Contractor may use equipment or materials of other manufacturers provided they are reviewed and accepted by Engineer and Owner as equivalent to those specified.**

1.5 REFERENCES (LATEST REVISION)

- A. ASTM C 62 – Building Brick (Solid Masonry Units Made from Clay or Shale).
- B. ASTM C 109 – Compressive Strength of Hydraulic Cement Mortars.
- C. ASTM C 144 – Aggregate for Masonry Mortar.
- D. ASTM C 150 – Portland Cement.
- E. ASTM C 207 – Hydrated Lime for Masonry Purposes.
- F. ASTM C 293 – Test Method for Flexural Strength of Concrete (Using Simple Beam with Center-point Loading).
- G. ASTM C 348 – Flexural Strength of Hydraulic Cement Mortars.
- H. ASTM C 478 – Precast Reinforced Concrete Manhole Sections.
- I. ASTM C 495 – Test Method for Compressive Strength of Lightweight Insulating Concrete.
- J. ASTM C 496 – Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens.
- K. ASTM C 579 – Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
- L. ASTM C 596 – Test Method for Drying Shrinkage of Mortar Containing Hydraulic Cement.
- M. ASTM C 666 – Test Method for Resistance of Concrete to Rapid Freezing and Thawing.
- N. ASTM C 882 – Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.
- O. ASTM C 924 – Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method.
- P. ASTM D 543 – Evaluating the Resistance of Plastics to Chemical Reagents.
- Q. ASTM D 638 – Tensile Properties of Plastics.
- R. ASTM D 695 – Compressive Properties of Rigid Plastics.
- S. ASTM D 790 – Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- T. ASTM D 2240 – Rubber Property – Durometer Hardness.
- U. ASTM D 2584 – Ignition Loss of Cured Reinforced Resins.

- V. ASTM D 4414 – Measurement of Wet Film Thickness by Notch Gages.
- W. ASTM D 4541 – Pull-off Strength of Coatings Using Portable Adhesion Testers.
- X. ACI 506.2 – Specification for Shotcrete.

1.6 SUBMITTALS

- A. The following items shall be submitted:
 - 1. Technical data sheet on each product used, including ASTM test results indicating the product conforms to and is suitable for its intended use per these specifications.
 - 2. Material Safety Data Sheets (MSDS) for each product used.
 - 3. Project specific guidelines and recommendations.
 - 4. Qualification of Product Installer:
 - a. Manufacturer certification stating product installer has been trained and permitted in the handling, mixing, and application of products to be used.
 - b. Certification the equipment to be used for applying products has been manufactured or accepted by the manufacturer and installer's personnel have been trained and certified for proper use of the equipment.
 - c. Five recent references of Contractor and installer indicating successful application, submitted at Engineer's request.
 - d. Proof of any necessary federal, state, or local permits or licenses necessary for the project.
 - 5. Design details for any additional ancillary systems and equipment to be used in site and surface preparation, application and testing.

1.7 MEASUREMENT AND PAYMENT

- A. Manhole Protective Coating – Payment will be made at the contract unit price per vertical foot for manhole diameter noted. Payment will include examination of existing manhole, interior surface preparation, application of repair materials, manhole chemical grouting (for sealing random or isolated leaks in brick or precast concrete manholes), invert repair (if necessary), and protective coating, and labor, testing, and all work necessary to complete the manhole protective coating including sewer bypassing operations.
- B. Manhole Frame and Chimney Seal – Interior – Payment will be made at the contract

unit price for each installation. Payment will include all labor, material, and sealant system accessories, and all work necessary to complete the manhole frame and chimney seal on the interior of the manhole including sewer bypassing operations.

- C. Manhole Frame and Chimney Seal – Exterior Above Grade – Payment will be made at the contract unit price for each installation. Payment will include all labor, materials, and rubber seal system and accessories, and all work necessary to complete the manhole frame and chimney seal on the exterior of the manhole including sewer bypassing operations.
- D. HDPE Manhole Insert – Payment will be made at the contract unit price per insert. Payment will include all labor, materials, and equipment necessary to complete the installation.
- E. Manhole Cover Replacement – Payment will be made at the contract unit price per each manhole cover replaced. Payment will include all labor, materials, and equipment necessary to complete the installation.
- F. Manhole Frame and Cover Replacement and Adjustment, At or Above Grade– Payment will be made at the contract unit price per each installation by type – At Grade or Above Grade. Payment will include excavation, removal and disposal, and replacement of existing frame and manhole cover, cleaning, adjusting materials, labor, and all work necessary to complete the adjustment and installation including sewer bypassing operations. Work within roadway areas includes the required pavement restoration in the Manhole Frame and Cover Replacement and Adjustment contract unit price.

1.8 QUALITY ASSURANCE

- A. Contractor will furnish the Engineer and Owner a description of all material before ordering. The Engineer will review Contractor's submittals and provide in writing an acceptance or rejection of material.
- B. Material and equipment shall be the standard product of a manufacturer who has manufactured them for a minimum of five (5) years and who provides published data on quality and performance of product.
- C. A subcontractor for any part of the work must have experience on similar work, and if required, furnish Engineer with a list of projects and Owners or Engineers who are familiar with their competence.
- D. Devices, equipment, and systems not designated by Engineer that the Contractor wishes to furnish, shall be designed by either a Registered Professional Engineer or by someone Engineer accepts as qualified. If required, complete design calculations and assumptions shall be furnished to the Engineer or Owner before acceptance.
- E. Contractor shall initiate and enforce quality control procedures consistent with applicable ASTM, NACE and SSPC standards and the manufacturer's recommendations.

- F. Contractors performing repairs shall be trained to properly apply the repair products according to manufacturer's recommendations.
- G. Contractors performing application of protective coating must be certified by the protective coating manufacturer and perform work according to manufacturer specifications.
- H. Appropriate actions shall be taken to comply with local, state and federal regulatory and other applicable agencies with regard to environment, health and safety.

1.9 PRODUCT DELIVERY, STORAGE & HANDLING

- A. Material shall be unloaded in a manner avoiding damage and shall be stored where it will be protected and will not be hazardous to traffic. If stored on private property, Contractor shall obtain permission from the property owner and shall repair any damage caused by storage. Material shall be examined before installation and neither damaged nor deteriorated material shall be used in the work.
- B. Materials are to be kept dry, protected from weather, and stored under cover.
- C. Protective coating materials are to be stored between 50° F and 90° F, or per manufacturers' requirements. Do not store near flame, heat, or strong oxidants.
- D. Protective coating materials are to be handled according to their material safety data sheets.

1.10 JOB CONDITIONS

- A. The manhole rehabilitation work must be coordinated with other work on site. Contractor shall replace or repair any pipe, materials, or structures damaged through the course of work.
- B. Contractor shall conform with all local, state, and federal regulations including those set forth by OSHA, RCRA and the EPA and any other applicable authorities.

1.11 SEQUENCING AND SCHEDULING

- A. The Contractor shall arrange work so rehabilitated manholes are placed in service as soon as reasonable after work is completed.
- B. Method statements and design procedures shall be provided to the Owner or Engineer by Contractor when confined space entry, flow diversion, or bypassing is necessary.

1.12 ALTERNATIVES

- A. The intention of these specifications is to produce the best system for the Owner. If Contractor suggests alternate material, equipment or procedures that will improve results at no additional cost, Engineer and Owner will examine the suggestion, and if it is accepted, it may be used. The basis upon which acceptance of an alternate will be

given is its value to Owner, and not for convenience of Contractor.

1.13 GUARANTEE

- A. Contractor shall guarantee the quality of materials, equipment, and workmanship for 12 months, unless specified otherwise elsewhere, after acceptance of completed project. Defects discovered during the 12 month guarantee period shall be repaired by Contractor at no cost to the Owner. Defects discovered in project components with longer guarantee periods shall be repaired in accordance with the specific guarantee terms.
- B. Manhole Protective Coating (Cementitious Mortar Lining) – the manhole protective coating shall have a ten (10) year warranty on both materials and labor.
- C. HDPE Manhole Insert – a five (5) year warranty on the body of the HDPE Manhole Insert shall be provided by the manufacturer.

1.14 EXISTING UTILITIES

- A. All known Town of Ridgeland utility facilities are shown schematically on the construction drawings and are not necessarily accurate in location as to plan or elevation. Utilities such as service lines or unknown facilities not shown will not relieve the Contractor of responsibility under this requirement. Contractor will be held responsible for cost of repairs to damaged underground facilities, even when such facilities are not shown on the drawings.
- B. The Contractor shall call for underground utility locations before starting work. Underground utilities location service can be contacted at (888) 721-7877 (SC) or 811.

1.15 MAINTENANCE OF TRAFFIC

- A. Traffic shall be maintained and controlled per SCDOT regulations, Contract Drawings, and project Encroachment Permit.

PART 2 – PRODUCTS

2.1 MANHOLE PROTECTIVE COATING (CEMENTITIOUS MORTAR LINING)

- A. General
 - 1. The Contractor shall provide a cementitious restoration material designed for structural build-back, inflow and infiltration abatement, corrosion resistance, and repairing inverts to design requirements. All materials applied to a structure shall be compatible, as specified by the manufacturer.
- B. Condition of Manhole to be Coated
 - 1. Standard Portland cement or new concrete (not quick setting high strength cement) must be well cured prior to application of the protective coating. Generally, 28 days is adequate cure time for standard Portland. If earlier

application is desired, compressive or tensile strength of the concrete can be tested to determine if acceptable cure has occurred.

2. Cementitious patching and repair materials should not be used unless their manufacturer provides information as to its suitability for topcoating with the proposed protective coating. Project specific submittals should be provided including application, cure time and surface preparation procedures which permit optimum bond strength with the protective coating.
3. Remove existing coatings prior to application of the new protective coating. Contractor is to maintain strict adherence to applicable NACE and SSPC recommendations with regard to proper surface preparation and compatibility with existing coatings.

C. Repair Materials

1. Repair materials shall be used to fill voids, structurally reinforce, and/or rebuild surfaces, etc. as determined necessary by Engineer and Contractor prior to application of the protective coating. Repair materials must be compatible with the specified coating and shall be applied in accordance with manufacturer's recommendations.
2. The following products are acceptable as compatible repair basecoat materials for calcium aluminate topcoating:
 - a. SewperCoat 100% calcium aluminate mortar by Kerneos Aluminate Technologies.

D. Protective coating material shall be:

1. Calcium aluminate mortar mix designed to withstand long-term exposure to a bacterically corrosive hydrogen sulfide environment. The mortar mix shall only require clean, potable water as an admixture to produce a material suitable for spray application. Mortar mix shall have the following chemical composition:

Al ₂ O ₃	CaO	FeO + Fe ₂ O ₃	SiO ₂
39 – 44%	35 – 39%	9 – 14%	5 – 7%

Design properties of the mortar mix shall be as follows:

Compressive Strength (ASTM C495)	> 7,000 psi	24 hours
	> 9,000 psi	28 days
Flexural Strength (ASTM C293)	> 1,200 psi	24 hours
	> 1,400 psi	28 days
Splitting Tensile Strength (ASTM C496)	> 800 psi	24 hours
Bond Strength/Slant Shear (ASTM C882)	> 1,600 psi	28 days

Shrinkage at 28 days (ASTM C596) Freeze/Thaw after 300 Cycles (ASTM C666)	< 0.06% cured @ 90% relative humidity. No visible damage after 300 cycles
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Mortar mix shall be stored with adequate provisions for the prevention of moisture absorption. It shall be stored in a manner permitting easy access for inspection and identification.

- E. Protective Coating Application Equipment – Specifically designed spray equipment, accepted for use by the protective coating manufacturer.

2.2 MANHOLE CHEMICAL GROUTING

- A. Chemical grouting may be used to seal random or isolated leaks of a brick or precast concrete manhole.
- B. Grout – Shall be acrylamide, acrylic, or urethane gels equivalent to those manufactured by Avanti International. The type of grout to be used shall be in accordance with the manufacturer’s recommendation for the specific application area of the project.

Following properties shall be exhibited by the grout:

1. Documented service of satisfactory performance in similar usage.
 2. Controllable reaction times and shrinkage through use of chemicals supplied by the same manufacturer. The minimum set time shall be established so adequate grout travel is achieved.
 3. Resistance to chemicals; to most organic solvents, mild acids, and alkali.
 4. The chemical shall be essentially non-toxic in a cured form.
 5. Sealing material shall not be rigid or brittle when subjected to dry atmosphere. The material shall be able to withstand freeze/thaw and moving load conditions
 6. Acrylate grouts may not be used.
- C. Additives – Grout additions may be utilized for catalyzing reaction, inhibiting reaction, buffering solution, lowering the freezing temperature of solution, acting as filler, providing strength, or for inhibition of root growth.
 - D. Material Identification – Contractor shall completely identify types of grout, mortar, and sealant to be used for project and provide case histories of successful use or defend choice of grouting materials based on chemical and physical properties, ease of application, and expected performance, to the satisfaction of Engineer.
 - E. Mixing and Handling – Mixing and handling of chemical grout, which may be toxic under certain conditions, shall be in accordance with recommendations of the

manufacturer and in such a manner as to minimize hazard to personnel. It is the responsibility of Contractor to provide appropriate protective measures to ensure chemicals or gels are handled by authorized personnel in a proper manner. All equipment shall be subject to acceptance by Engineer. Only personnel thoroughly familiar with the handling of grout material and additives shall perform grouting operations.

2.3 MANHOLE FRAME AND CHIMNEY SEAL - INTERIOR

- A. Manhole Frame and Chimney Seal – Interior, shall be designed to prevent leakage of water into the manhole through the frame joint area and the area above the manhole cone including all extensions to the chimney area. Extensions shall include but are not limited to lifting rings, brick and/or block material that may have been used to achieve grade. The seal shall remain flexible allowing for the repeated vertical or horizontal movements of the frame due to frost lift, ground movement or the thermal movement of pavements.
- B. The sealing system shall be applied to the entire interior of the adjustment area from the top 2-inches of the cone/top of the manhole, over the grade ring adjustment area, and up a minimum of 2-inches on to the inside of the casting frame. If the manhole has been relined prior to the seal installation, the seal shall cover a minimum of 12 vertical inches to cover the casting-cone interface.
- C. The sealing system material shall be an aromatic urethane rubber to the standards noted below, such as Flex-Seal Utility Sealant manufactured by Sealing Systems Inc., Loretto, MN or approved equal.
 - 1. The lining product shall have an aromatic urethane primer resin on the complete application surface.
 - 2. The final seal material shall be no less than 170 mils of corrosion resistant aromatic flexible urethane resin coating, or as recommended by manufacturer based on project location.
 - 3. The product shall have a minimum elongation of 800% and hardness (Durometer) of 75. Final seal shall have minimum tensile and adhesion strengths of 1150 psi and 175 lb. l/in. respectively.
 - 4. The sealing system shall conform to the physical requirements of ASTM D- 412.

2.4 MANHOLE FRAME AND CHIMNEY SEAL – EXTERIOR AND ABOVE GRADE

- A. Manhole Frame and Chimney Seal – Exterior and Above Grade, shall be used as noted on the Contract Drawings where manhole chimney extends above grade. The sealing product shall seal the manhole frame casting to the manhole structure. The seal shall be designed to prevent leakage of water into the manhole through these areas.
- B. Product Materials:
 - 1. The seal shall be a continuous seamless band made of high quality UV resistant EPDM (Ethylene Propylene Diene Monomer) rubber with a minimum thickness

of 65 mils.

2. There shall be a preformed L-shaped corner molded into the top of the seal. The top section and the side section will extend from the L-shaped corner at a generally 90° angle to each other. The seal shall be pre-formed in substantially the same shape as when attached to the manhole structure. The thickness of the L-shaped corner extending 1-inch into the top section and 1-inch down the side section is increased and may be at least twice the thickness of the top section reinforcing the seal at this particular area.
 3. There shall be a 2-inch to 3-inch wide strip of butyl mastic attached to the underside of top section of the seal. There shall be a 2-inch wide strip of butyl mastic attached to the inside of the side section at the bottom of the seal. The mastic shall be non-hardening butyl rubber sealant, with a minimum thickness of 1/8-inch, and shall seal to the cone/top of the manhole section and over the flange of the casting frame.
 4. An aerosol primer shall be used to enhance the bond strength of the seal to the structure.
- C. The external sealing system shall be Infi-Shield Uni-Band Manhole Sealing System by Sealing Systems, Inc., Loretto, MN, or Engineer approved equal.

2.5 MANHOLE INVERT REPAIR

- A. Concrete with a minimum compressive strength of 3,000 psi at 28 days.
- B. Brick and Mortar
 1. Brick – Shall conform to ASTM C62, Grade SW or C-55, Grade S.
 2. Mortar – Shall be composed of one part by volume of portland cement and two parts of sand. Portland cement shall conform to ASTM C-150, Type I or II. The sand shall conform to ASTM C-144 and shall be of an accepted gradation. Hydrated lime may be added to mixture of sand and cement in an amount equal to 25% of the volume of cement used. Hydrated lime shall conform to ASTM C-207, Type S. Quantity of water in the mixture shall be sufficient to produce a workable mortar, but shall in no case exceed 7 gallons of water per sack of cement. Water shall be clean and free of harmful acids, alkalies, and organic impurities. The mortar shall be used within 30 minutes from time ingredients are mixed with water.

2.6 HDPE MANHOLE INSERT

- A. HDPE Manhole Insert shall be made of ultra high density polyethylene copolymer material that meets ASTM D1248, Class A, Category 5, Type 111 with a minimum impact brittleness temperature of <-131°F. Thickness shall be uniform 0.187 mils (3/16") minimum. Material shall be corrosion proof from all gases associated with wastewater collection systems.

- B. HDPE Manhole Insert shall be customized to fit the existing/proposed casting frame and lid.
- C. HDPE Manhole Insert shall have a lift strap made of woven polypropylene web which is attached to the bowl of the dish by a wide head stainless steel rivet and a stainless steel 3/4" backup washer. All cut edges shall be seared to prevent raveling.
- D. HDPE Manhole Insert shall provide ventilation with 1/8" vent hole and/or a valve located on the side of the insert. The hole or valve shall allow a maximum release of 10 gallons of water per 24 hours and shall not be affected by debris on the bottom of the dish. Gases shall be vented at one (1) PSI or less.
- E. A neoprene gasket shall be provided with each HDPE Manhole Insert. The gasket shall be 1/8" thick by 5/8" wide.
- F. HDPE Manhole Insert shall be as manufactured by Sealing Systems, Inc., Loretto, MN 55357, www.ssisealingsystems.com or an accepted equivalent.

2.7 MANHOLE FRAME AND/OR COVER REPLACEMENT AND ADJUSTMENT

- A. For manholes where both manhole frame and cover are to be replaced:
 - 1. Manhole frames and covers shall be gray cast iron conforming to minimum requirements ASTM A48, Class 35, and shall conform in general to the details for each type shown on the plans. Castings shall be of uniform quality, and free from blowholes, porosity, hard spots, shrinkage distortion and other defects. Frames and covers shall be smooth, well-cleaned by shot blasting and shall remain unpainted. All castings shall be manufactured true to pattern, and component parts shall fit together in a satisfactory manner. Frames shall have a clear opening of 22-3/4". There shall be no holes or perforations in the cover. The frame and cover shall have a rubber gasket that is fitted in a machined groove manufactured in the bottom of the cover. All manhole frames and covers shall be traffic bearing unless otherwise specified. Manholes shall be adjustable to changes in final pavement elevation without the use of spaces or rings. Casting patterns shall conform to those shown on the Drawings. Manhole frame and cover shall be as manufactured by U.S. Foundry, Model 680.
- B. For manholes where only cover is to be replaced:
 - 1. Manhole covers shall be gray cast iron conforming to minimum requirements ASTM A48, Class 35, and shall conform in general to the details for each type shown on the plans. Castings shall be of uniform quality, and free from blowholes, porosity, hard spots, shrinkage distortion and other defects. Covers shall be smooth, well-cleaned by shot blasting and shall remain unpainted. Cover dimensions shall be selected to ensure satisfactory fit with existing casting. There shall be no holes or perforations in the cover. The cover shall have a rubber gasket that is fitted in a machined groove manufactured in the bottom of the cover. All manhole covers shall be traffic bearing unless otherwise specified. Manhole cover shall be as manufactured by U.S. Foundry.
- C. For frame adjustment:

1. Mortar – Shall be composed of one part by volume of Portland cement and two parts of sand. The Portland cement shall conform to ASTM C–150, Type I or II. The sand shall conform to ASTM C–144 and shall be of an acceptable gradation. Hydrated lime may be added to mixture of sand and cement in an amount equal to 25% of the volume of cement used. Hydrated lime shall conform to ASTM C–207, Type S. Quantity of water in the mixture shall be sufficient to produce a workable mortar, but shall in no case exceed 7 gallons of water per sack of cement. Water shall be clean and free of harmful acids, alkalies and organic impurities. The mortar shall be used within 30 minutes from time ingredients are mixed with water.
2. Brick shall conform to ASTM Specification C–62, Grade SW or C–55, Grade S.
3. Precast concrete adjusting rings.

2.8 PRODUCT REVIEW

- A. Contractor shall provide the Engineer with a complete description of all products before ordering. Engineer will review all products by the submittal of shop drawings before they are ordered.

PART 3 – EXECUTION

3.1 MANHOLE PROTECTIVE COATING (CEMENTITIOUS MORTAR LINING)

- A. Examination
 1. All structures to be coated shall be readily accessible to Contractor.
 2. Any active flows shall be dammed, plugged, or diverted as required to ensure the liquid flow is maintained below surfaces to be coated. Flows should be totally plugged and/or diverted when coating the invert. All extraneous flows into manhole at or above area coated shall be plugged and/or diverted until coating has set hard to the touch.
 3. Pipe joint seals shall be installed by others. No leaks may be present prior to commencing and during work.
 4. Installation of protective coating shall not commence until the concrete substrate has properly cured in accordance with these specifications.
 5. Temperature of the surface to be coated should be maintained between 40 deg F and 120 deg F during application, or as required by coating manufacturer. Prior to and during application, care should be taken to avoid exposure of direct sunlight or other intense heat source to the structure being coated. Where varying surface temperatures do exist, care should be taken to apply coating when the temperature is falling versus rising (i.e. late afternoon into evening vs. morning into afternoon).

B. Surface Preparation

1. All manhole steps shall be removed prior to a coating or lining application.
2. Contractor shall inspect all surfaces specified to receive a protective coating prior to surface preparation. Contractor shall notify Owner and Engineer of any noticeable disparity in surfaces which may interfere with proper preparation or application of the repair mortar and protective coating.
3. All concrete or mortar which is not sound or has been damaged by chemical exposure shall be removed to a sound surface.
4. All contaminants including: oils, grease, incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, or other contaminants shall be removed.
5. Surface preparation method(s) should be based upon conditions of substrate, service environment and requirements of the protective coating to be applied.
6. All surfaces shall be repaired as required by protective coating system in the intended service condition.
7. Surfaces to receive protective coating shall be cleaned and abraded to produce a sound surface with adequate profile and porosity to provide a strong bond between the protective coating and substrate. Generally, this can be achieved with a high pressure water cleaning using equipment capable of 5,000 psi at 4 gpm. Other methods such as high-pressure water jetting (refer to NACE Standard No. 5/SSPC-SP12), abrasive blasting, shotblasting, grinding, scarifying or acid etching may also be used. Detergent water cleaning and hot water blasting may be necessary to remove oils, grease, or other hydrocarbon residues from the concrete. Whichever method(s) are used, they shall be performed in a manner providing a uniform, sound, clean neutralized surface not excessively damaged. Contractor shall catch debris from cleaning efforts within the manhole. Debris passing into pipelines shall be cleaned at the Contractor's expense.
8. A mild chlorine solution may be used to neutralize the surface to diminish microbiological bacteria growth prior to final rinse and coating.
9. Infiltration shall be stopped by using a material which is compatible with the specified repair mortar and is suitable for topcoating with specified protective coating.
10. Test prepared surfaces after cleaning but prior to application of protective coating to determine if a specific pH or moisture content of the concrete is required according to manufacturer's recommendations.
11. Area between the manhole and manhole ring and any other area which might exhibit movement or cracking due to expansion and contraction, shall be grouted

with a flexible or elastomeric grout or gel. Castings can be abrasive blasted and coated to prevent corrosion if desired.

a. Where chimney seal is required in conjunction with the lining, the Contractor shall contact the chimney seal manufacturer to determine the proper preparation required for effectively installing the chimney seal after the coating has been applied and cured.

12. All surfaces shall be checked by Engineer's Representative during and after preparation and before the repair mortar is applied.

C. Application of Repair Materials

1. Areas where structural steel has been exposed or removed shall be repaired in accordance with the Engineer's recommendations.

2. Repair materials shall meet the specifications herein. Materials shall be trowel or spray applied utilizing proper equipment on to specified surfaces. Material thickness shall be specified by the Engineer according to Owner's requirements and manufacturer's recommendations.

3. Cementitious repair materials shall be trowelled to provide a smooth surface with an average profile equivalent to coarse sandpaper to optimally receive the protective coating. No bugholes or honeycomb surfaces should remain after the final trowel procedure of repair mortar.

4. The repair materials shall be permitted to cure according to manufacturer recommendations. Curing compounds should not be used unless formulated for compatibility with the specified protective coating.

5. Application of repair materials, if not performed by a coating certified applicator, shall be checked by the protective coating certified applicator to ensure proper finishing for suitability to receive specified coating.

6. After abrasive blast and leak repair is performed, all surfaces shall be checked for remaining laitance prior to protective coating application. Any evidence of remaining contamination or laitance shall be removed by additional abrasive blast, shotblast or other acceptable method. If repair materials are used, refer to these specifications for surface preparation. Areas to be coated must also be prepared in accordance with these specifications after receiving a cementitious repair mortar and prior to application of the protective coating.

7. All surfaces shall be checked during and after preparation and before the protective coating is applied.

D. Application of Protective Coating

1. Application procedures shall conform to recommendations of the protective coating manufacturer, including material handling, mixing, environmental

controls during application, safety, and spray equipment.

2. The spray equipment shall be specifically designed to accurately ratio and apply specified protective coating materials and shall be regularly maintained and in proper working order.
3. Protective coating material must be spray applied by a certified applicator of the protective coating manufacturer.
4. Manhole walls, benches, and frame shall be coated by spray application of the protective coating with a uniform thickness. Material shall be applied to bench area to provide for proper drainage. Spray application of calcium aluminate mortar will have a minimum finished thickness of 1/2 inch.
5. Airless spray application equipment acceptable to coating manufacturer shall be used to apply each coat of the protective coating.
6. If necessary, subsequent top-coating or additional coats of the protective coating should occur as recommended by protective coating manufacturer.

E. Testing

1. Visual Inspection – verify no infiltration, cracks, or loose material.
2. Thickness of calcium aluminate will be measured with a ruler while the material is still wet.
3. Measurement of protective coating bond strength to the substrate can be measured in accordance with ASTM D4541. Any areas detected to have inadequate bond strength shall be evaluated by the Engineer. Further bond tests may be performed in failed area to determine the extent of potentially deficient bonded area and repairs shall be made by Applicator in strict accordance with manufacturer's recommendations.
4. Manhole Testing – Type A: Vacuum test. All pipes entering manhole shall be plugged, taking care to securely place plugs from being drawn into the manhole. The test head shall be placed and seal inflated in accordance with manufacturer's recommendations. A vacuum of 10 inches of mercury shall be drawn and the vacuum pump shut off. With the valves closed, time shall be measured for the vacuum to drop to nine (9) inches. Following are minimum allowable test times for manhole acceptance at the specified vacuum drop:

DEPTH (FEET) (Manhole length)	TIME (SECONDS)		
	48-Inch diam.	60-Inch diam	72-Inch diam
4	10	13	16
8	20	26	32
12	30	39	48
16	40	52	64
20	50	65	80
24	60	78	96
Add for 2-feet more depth:	5	6.5	8

Note: These numbers have been taken from ASTM C 924.

If a manhole fails the initial test, repairs and adjustments necessary due to extenuating circumstances (i.e. pipe joint, liner, plug sealing) should be made. Retesting shall proceed until a satisfactory test is obtained.

Manhole Testing – Type B: Exfiltration test. Incoming and outgoing sewer and service lines shall be plugged, plugs restrained and the manhole filled with water to top of manhole frame. A soaking period of up to one hour will be allowed if bypassing of the sewage is not required or has been provided. At the end of this optional soaking period, manhole shall be refilled with water and test begun. If water loss exceeds amount shown in the following table, manhole will have failed test. Repairs and adjustments necessary due to extenuating circumstances (i.e. pipe joint, liner, plug sealing) should be made. Retesting shall proceed until a satisfactory test is obtained. Maximum Allowable Loss is determined assuming a standard 4-foot diameter manhole.

<u>Depth of Manhole</u>	<u>Maximum Allowable Loss</u>
Under 8 feet deep	1 inch in 5 minutes
Over 8 feet deep	1/8 inch per foot of depth in 5 minutes

Limitations and considerations include recognizing exfiltration and vacuum testing may be impractical or cost-prohibitive for all manholes; therefore, use of either method is subject to the following limitations and considerations:

Complete Sealing: These methods are used only when the entire manhole has been sealed or rehabilitated. The lack of sealing or rehabilitation of some portions of manhole may prevent passage of either of these tests. Spot repairs and partial sealing or rehabilitation are therefore subject to infiltration and visual testing only.

Structural Condition: Structural condition of some manholes may be such the testing with these methods is impractical or destructive. The Owner's Representative and Contractor shall therefore deem as structurally sound, prior to testing using these methods, those manholes which have not been structurally lined.

5. A final visual observation shall be made by the Engineer and manufacturer's representative. Any deficiencies in the finished coating shall be marked and repaired according to the procedures set forth herein by Manufacturer's Representative.
6. The system may be put back into non-severe operational service as soon as final observation has taken place. However, for severe corrosion duty such as high concentrations of acids, bases or solvents, 3 to 7 days and/or force cure by heat induction to the coated surfaces may be necessary prior to returning to service. Consult coating manufacturer for further details.

3.2 MANHOLE CHEMICAL GROUTING

- A. Chemical grouting may be used to seal random or isolated leaks of a brick or precast concrete manhole.
- B. Manhole grouting shall not be performed until repair of the manhole frame and grade rings or any other structural manhole repairs are complete.
- C. Preliminary Repairs
 1. Contractor shall cut and trim all roots within the manhole.
 2. Contractor shall seal all unsealed lifting holes, unsealed step holes, and voids larger than approximately 1/2 inch in thickness. All cracked or deteriorated material shall be removed from the area to be patched and replaced with a waterproof quick setting mortar in accordance with manufacturer's specifications.
 3. Contractor shall control all inflowing water through cracks, manhole joints, brick joints, pipe entrances, grade rings, and manhole frames.
- D. Temperature – Normal grouting operations shall be performed in accordance with manufacturer's recommendations.
- E. Testing – Visual Inspection – all leaking into manhole at chemical grout usage locations must be eliminated.

3.3 MANHOLE FRAME AND CHIMNEY SEAL - INTERIOR

- A. Manhole Frame and Chimney Seal – Interior product system shall be applied by an applicator/installer certified by manufacturer.
- B. Surface Preparation:
 1. All loose and protruding mortar and brick that would interfere with the seal's performance shall be removed. Any lips for gravel pan supports shall be cut off flush with casting.

2. Contractor shall verify compatibility of any patching materials or cement profiling materials, or manhole liner systems used with the sealing system and required cure time prior to installing seal system.
3. Preparation of the surface should include sandblasting (minimum of 70CFM) and an acetone wet wipe to ensure a clean surface as required by manufacture.
4. Active leaks (infiltration) must be corrected prior to installing the sealing system.
5. The substrate surface must be free of sand, loose debris, latencies, dust, oil, grease or chemical contamination.
6. Ensure casting and structure surfaces are clean and dry where the primer is intended to adhere.
7. After allowing for proper drying of primer to occur, sealant may be applied by brush as evenly as possible over the application area.
 - a. The sealing system shall be applied to the entire interior of the adjustment area from the top 2-inches of the cone/top of the manhole, over the grade ring adjustment area, and up a minimum of 2-inches on to the inside of the casting frame. If the manhole has been relined prior to the seal installation, the seal shall cover a minimum of 12 vertical inches to cover the casting-cone interface.

C. Testing

1. Visual inspection – final seal system shall be completely free of pinholes or voids. The Contractor is to furnish the Engineer two (2) mirrors with extension handles that can be used to inspect sealant application to areas underneath frame without entry of manhole. These items will become the property of the Owner upon completion and at no additional cost of this item.

3.4 MANHOLE FRAME AND CHIMNEY SEAL – EXTERIOR AND ABOVE GRADE

- A. The sealing system shall be installed according to the manufacturer’s recommendations.
- B. Surface Preparation:
 1. Clean the flange of the casting frame and the top 5-inch area of the cone of the manhole with a wire brush and whisk broom. Both areas must be clean and dry.
 2. Apply the aerosol primer on the casting flange where the mastic on the inside top section will bond to the structure.
- C. Installation:
 1. Install the sealing band on the outside surface of the adjustment ring area covering all grade rings. The seal should be position with the L-shaped corner at the top of the manhole structure.

2. Remove the protective tape from the non-hardening butyl mastic located under the top section of the seal. Position the top section to lie flat on the base/flange of the frame.
3. Position the 2-inch bottom section of the seal just below the top of the concrete cone. Fold back the bottom mastic portion of the seal. Apply the aerosol primer on the top of the cone where the mastic will bond. Allow to dry and become tacky.
4. Remove the protective tape from the non-hardening butyl mastic located inside the bottom section. Fold the bottom of the seal back onto the structure and with a rubber hammer tap the seal's top and bottom mastic areas onto the structure.
5. Clean a 5-inch area on the cover with a brush. Position the inspection tab on the side of the casting frame and onto the cover. Remove the protective tape from the mastic on the free end of the inspection tab and fasten the inspection tape onto the cover tapping it into place with a rubber hammer.
6. Backfill around manhole to grade and as noted on the Contract Drawings.

3.5 MANHOLE INVERT REPAIR

- A. Plug influent lines into manhole. Bypass sewage as necessary. Clean manhole bottom of all water, sewage, debris, and all substances preventing concrete or mortar from bonding to the existing structure.
- B. Construct inverts and benches using concrete or brick and mortar. Dimensions shall conform to detail on the contract drawings. Newly constructed invert shall cure adequately before allowing flow through manhole. Any damage to the invert due to flow of sewage will be repaired at Contractor's expense.

3.6 HDPE MANHOLE INSERT

- A. Remove manhole cover and clean manhole rim or flange free of any dirt or debris to ensure accurate measurements.
- B. Locate the clear opening of the manhole diameter measurement and the outer edge of the manhole rim diameter measurement as per manufacturer's instruction. Coordinate with manufacturer regarding measurements, type of manhole frame and cover, and foundry of origin, if available.
- C. Install or ensure neoprene gasket is installed with adhesive backing on the underside of the insert rim.
- D. Install and fully seat the insert upon the manhole frame rim and replace cover.

3.7 MANHOLE FRAME AND/OR COVER REPLACEMENT AND ADJUSTMENT

- A. For manholes where frame and cover are to be replaced:

1. Remove existing frame and cover from manhole. Clean existing brick or precast manhole top of dirt and loose brick, mortar or concrete.
 2. Adjust frame height as necessary and in accordance with the Contract Drawings by one of the following methods. For manholes where the adjustment is to be above grade, only precast concrete adjusting rings shall be used.
 - a. Place a minimum of 1/2 inch thick and 4 inches wide layer of mortar to receive the first course of brick. Joints between brick shall be completely filled and shall be smooth and free from surplus mortar on the inside of manhole. Continue with mortar and brick courses until appropriate grade is attained. Brickwork shall be plastered with 1/2 inch of mortar over the entire inside and outside. For square or rectangular structures, brick shall be laid in stretcher courses with a header course every sixth course. For round structures, brick shall be laid radially with every sixth course a stretcher course.
 - b. Place a minimum of 1/2 inch thick and 4 inches wide layer of mortar to receive the first precast concrete adjusting ring. Continue with mortar and adjusting ring courses until appropriate grade is attained. Precast concrete rings shall be plastered with 1/2 inch of mortar over the entire inside and outside.
 2. Set frame in 1/2 inch thick layer of mortar and install cover in accordance with manufacturer's installation instructions.
- B. For manholes where cover only is to be replaced:
1. Remove existing cover from manhole. Clean existing frame of dirt and corrosion.
 2. Measure existing frame and gather dimensions appropriate for replacement cover.
 3. Replace the existing cover with new approved solid, gasketed cover.

3.8 BYPASSING

- A. Bypassing of raw wastewater onto the ground or into a receiving stream is prohibited.
- B. Bypassing shall be accomplished with pumping equipment sufficient to maintain the flow of wastewater. Contractor shall provide pump, hoses, materials, and labor to operate and maintain the bypassing operation. A backup pump shall also be made available by the Contractor. Bypassing operations shall be reviewed and acceptable to the sewer system operator before being implemented.

END OF SECTION 02960

SECTION 02961

TEMPORARY SEWER BYPASS PUMPING OPERATIONS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The Contractor shall design and furnish all tools, supplies, materials, labor, equipment, power, and maintenance necessary for the installation, testing, placing into operation, maintaining, and monitoring of a temporary bypass pumping system for the purpose of diverting the existing sewer flows around work areas for the Town of Ridgeland Water and Sewer Resiliency Improvements project. At no point during the setup, installation, operation, or demobilization of the temporary bypass pumping systems shall interruption of any pump stations and/or sewer collection systems be caused.
- B. The design, installation, operation, and monitoring of the temporary bypass pumping system shall be the Contractor's responsibility. The Contractor shall employ the services of a vendor who can demonstrate to the Owner and Engineer that it specializes in the design and operation of temporary bypass pumping systems. The vendor shall provide at least five (5) references of projects of a similar size and complexity as this project performed by the vendor's firm within the past ten years.
- C. The bypass system shall meet the requirements of all Federal, State, and Local codes and regulatory agencies having jurisdiction.
- D. Measurement and Payment: No separate payment shall be made for temporary bypass pumping operations. The cost of such operations shall be included in the Part I pump station facility improvement lump sum bid item, or the appropriate unit price item in Part II sewer rehabilitation.

1.2 DEFINITIONS

- A. "Interruption of pumping operations" is defined as any activity that will result in a change in the current method of operation. Contractor shall request such "interruption of pumping operations" from the Owner no less than ninety-six (96) hours in advance. The Owner may defer the request as allowed by Article 2.01 A. 4 of this Section.
- B. "Partial Utilization", "Substantial Completion", and "Warranty Period for Items in Continuous Service": Refer to the "Contract Documents" for definition.
- C. The terms "open, close, start, stop, operate, verify, energize, de-energize, transfer, switchover, etc" when used in conjunction with permanent equipment at LS3 that is in-service or about to be placed in-service are understood to mean: Owner's operation or maintenance staff shall perform the operation upon written request from the Contractor.
- D. The term "operational test" refers to the period of specified duration that the installed system is tested to verify operational integrity of a system prior to placing the system in-service. Operational testing requires that representatives of the equipment

manufacturers be on-site for timely identification and resolution of system issues.

- E. "Low Flow Period" refers to the time of day when the pump station flow rate reaches the diurnal minimum. It typically occurs between the hours of 3 AM and 7 AM.

1.3 SUBMITTALS

- A. Bypass Pumping Plan: The Contractor shall submit to the Engineer detailed Drawings and shop drawings outlining all provisions and precautions to be taken by the Contractor regarding the handling of existing wastewater flows. The plan will be signed and sealed by a Professional Engineer registered in the state of South Carolina for all bypassing operations necessary for taking a Town of Ridgeland pump station offline. The plan shall be specific and complete, including such items as schedules, locations, elevations, capacities of equipment, materials, connections, and all other incidental items necessary and/or required to insure proper protection of Owner facilities, including protection of the access and bypass pumping locations. No bypassing operations shall begin until all provisions and requirements have been reviewed and approved by the Owner and Engineer. The plan shall include, but is not limited to, the following details:

1. Detailed drawings showing all required equipment and staging areas for pumps within facility sites or right-of-way areas or other approved areas;
2. Plugging methods and types of plugs;
3. Number, size, material, location and method of installation of suction piping;
4. Number, size, material, method of installation and location of installation of discharge piping;
5. Bypass pump sizes, capacity, number of each size to be on site and power/fuel requirements;
6. Pump curves showing pump operating range are to be submitted;
7. Thrust and restraint block sizes and locations as necessary in accordance with manufacturer/supplier of LineStops, Insert Valves, and other equipment to be installed within piping, if any;
8. Sections showing suction and discharge pipe depth, embedment, select fill and special backfill, and any equipment necessary to maintain clearance for construction activities;
9. Method of noise control for each pump. Facilities are located within residential areas.
10. Any temporary pipe supports and anchoring required;
11. Design for access to bypass pumping locations indicated on the Drawings;
12. Selection of bypass pumping pipe size;

13. Schedule for installation of and maintenance of bypass pumping lines.
14. Emergency plan for adverse weather and flooding for various phases of the Work.
15. Contractors plan for providing continuous monitoring of the bypass pumping operations including qualifications of any onsite monitoring persons and specifications of any electronic monitoring operations. Automatic dialer shall be installed to notify emergency contacts.

B. Sequence of Construction Plan

1. Contractor shall submit the proposed Sequence of Construction to the Engineer for review and approval. The Sequence of Construction shall define work to be performed, including the following items:
 - a. Definition of the start date, duration and end date for each of the segments of the work.
 - b. For each segment of work, define activities to be performed by or witnessed by the Owner and date on which these activities are to be performed.
 - c. Scheduling/timing of manufacturer's field services, as specified.
2. Provide complete list of equipment and material that is required to perform each segment of work.

1.4 SPECIAL PRECAUTION

- A.** The Contractor is notified that the bypass pumping operations are critical and must be maintained at all times. If any spills of raw wastewater occur due to the failure of the Contractor to maintain the temporary bypass pumping when needed, the Contractor shall be responsible for any fines levied on the Owner by the SCDHEC or any other applicable agency.

PART 2 – PRODUCTS

2.1 PUMPING EQUIPMENT

A. General:

1. The noted project areas for pump station improvements and sewer rehabilitation are critical parts of the Owner's sewer system and the flow conveyance must be kept in service at all times. It is essential to the operation of the existing wastewater system that there be no interruption in the conveyance of wastewater to and from any project work area throughout the duration of the project. To this end, the Contractor shall provide, maintain, operate, and monitor all temporary facilities such as dams, plugs, pumping

equipment (both primary and back-up units as required), conduits, all necessary power/fuel, and all other labor and equipment necessary to intercept the wastewater flow before it reaches the point where it would interfere with the construction work, carry it past the work and return it to the existing system downstream of the work.

2. It is the Contractor's responsibility to provide equipment that is adequate for the performance of the temporary bypassing operations under this Contract within the time specified. All equipment shall be kept in satisfactory operating condition, shall be capable of safely and efficiently performing the required operations, and shall be subject to review by the Owner's representative at any time within the duration of the Contract. All operations hereunder shall conform to the applicable requirements of the OSHA Standards for construction.
3. Should the Contractor fail to maintain the continuous operation of the bypass pumping system and operations, the Owner shall repair/operate the bypass pumping system to maintain station operation. Owner shall look to recover the costs for labor, materials, sewage hauling and any other activities required and costs incurred during operation/repair of the temporary bypass system from monies owed the Contractor for other portions of the project work.
4. Pump station operational requirements take precedence over Contractor activities. Therefore, interruption of pump station operations shall be coordinated and are subject to the operational requirements of the Owner. Contractor shall assume that any interruption of pumping system operations may be deferred by up to one week from the requested time due to operational constraints.
5. The Contractor shall provide for utilities and services for its own operations. The Contractor shall furnish, install and maintain all temporary utilities during the contract period including removal upon completion of the project work.
6. Pumps used shall be fully automatic self-priming units that do not require the use of foot-valves in the priming system.
7. The pumps shall be engine driven on skid bases or highway trailer with centralized lifting bracket and integral fuel tank. The pump shall be direct coupled to an electric start diesel engine.
8. All pumps used shall be constructed to allow dry running for long periods of time to accommodate the cyclical nature of the flows.
9. All pumps shall be High Pressure Solids Handling Self-Priming Pumps as manufactured by Thompson Pump & Manufacturing Co., Inc. in state of Florida, Godwin Pumps of America, Inc., or Engineer approved equal.
10. Furnish each pump with the necessary stop/start controls.
11. Contractor shall not be permitted to stop or impede the main flows under any circumstances except as otherwise defined and approved by Owner and Engineer under the sequence of construction. The Contractor shall maintain

sewer flow around the work area in a manner that will not cause surcharging of sewers, damage to sewers and that will protect public and private property from damage and flooding.

12. The Contractor shall protect water resources, wetlands and other natural resources.
- B. Temporary Bypass Pumping Requirements: The Contractor shall be responsible for the construction of the temporary bypass facilities as described herein and indicated on the Drawings. Requirements for the bypass pumping system are as follows:
1. Bypass pumping system shall be operated 24 hours per day once put into operation until such time as new/rehabilitated sewer facilities are approved for operation by Owner and Engineer.
 2. Provide two pumps at each bypass pumping location, consisting of one duty pump and one standby pump. The standby pump shall be piped into the suction and discharge headers and shall be on-line and ready for use in the event it is needed. The two pumps combination shall consist of two sound attenuated, diesel driven pumpsets (lead, backup).
 3. Bypass pump shall each have a performance curve that meets or exceeds the performance curve for the required bypass operations at each bypass pumping location.
 - a. Reference Section 11305 Submersible Pumps and project Drawings for require Part I pump station bypassing capacities. Unless otherwise noted, bypassing capacity shall match proposed pump conditions. Additional information can be provided by Town and Engineer during construction.
 - b. For Part II sewer rehabilitation, all existing project gravity sewers are 8-inch or 10-inch. Additional information can be provided by Town and Engineer during construction.
 4. Contractor shall provide continuous monitoring of the bypass pumping operations whether by electronic monitoring operations or by personnel monitoring operations during entire period of active bypass operations to ensure continuous operation of the system. Automatic dialer shall be installed to notify emergency contacts.
 5. The bypass pumps shall be quiet models producing no more than 70 dBA at a distance of 23 feet.
 6. Provide all necessary pipeline plugs, LineStops, Insert Valves, pumps of adequate size to handle peak flows, and temporary suction and discharge piping and fittings to ensure that the total current flow capacity of pump station or sewer main can be safely diverted around the project work area while the facility is modified and/or not in operation.
 7. If removal or modification of any portion of the upstream manhole(s) is necessary to utilize as a suction location(s), contractor is responsible for securing the area and prohibiting public access to the manhole(s). Contractor

shall restore the manhole(s) to pre-construction condition.

8. The Contractor shall make all arrangements for temporary bypass pumping operations during the time when the pump station or sewer main is shut down for any reason. The bypass system must overcome any existing force main pressure on the discharge.
9. Discharge Piping shall be constructed of steel, ductile iron, or polyethylene pipe with positive, restrained joints. Under no circumstances will aluminum "irrigation" type piping or glued PVC pipe be allowed. Discharge hose will only be allowed in short sections and by specific permission from the Engineer.
10. Operation: The bypass pumps shall have variable capacity by controlling the speed of the diesel engine. Each pump shall have a separate control panel.
11. Provide vacuum and pressure gauges on the suction and discharge headers.
12. Provide controls to automatically start, stop, and vary the pump operations in accordance with the approved control sequence.
13. Control Sequence – Contractor shall coordinate with the Owner operations staff to determine appropriate set points and controls for temporary bypass pumping operations.

2.2 EMERGENCY RESPONSE

- A. Contractor shall provide technician(s) capable of maintaining and trouble-shooting the bypass system on-call in case of an emergency on a 24 hour basis to maintain or re-establish pump sets. Technician shall submit incident reports and turn them into the Owner within 24 hours of any incident.
- B. The Contractor and the Owner's Representative shall be linked by cell phone 24 hours a day during the course of the bypass operations. Any alarms shall initiate a call to the Contractor and the Owner. Contractor and Owner shall each have a minimum of three (3) individuals listed within the "calling tree". Starting with Contractor contacts, if the first contact does not confirm receipt of the alarm call, then the next contact shall be called until the alarm is either confirmed and/or all contacts are called. Owner's link into the alarm status is only for informational purposes. The Contractor shall be responsible for all bypass alarm conditions and shall be required to resolve the condition that is causing the alarm to occur.

PART 3 – EXECUTION

3.1 PREPARATION

- A. The Contractor shall be responsible for locating any existing utilities in the area where the Contractor selects to locate the bypass pumps and pipelines. The Contractor shall locate the bypass pipelines to minimize any disturbance to existing utilities and shall obtain approval of the pipeline locations from Owner and the Engineer. All costs associated with relocating utilities and obtaining all approvals shall be paid by the Contractor. Construction activities shall not be impeded by bypass piping.

- B. During bypass pumping operations, the Contractor shall protect the pump station, sewer mains, and force main from damage inflicted by the Contractor's equipment and operations. The Contractor shall be responsible for all physical damage to the sewer facilities caused by human or mechanical failure.
- C. During bypass pumping, do not allow sewage to be leaked, dumped, or spilled in or onto any area outside of the existing sanitary sewer system.
- D. In the event of accidental spill or overflow, immediately stop the discharge and take action to clean up and disinfect the spill. Promptly notify the Owner and Engineer so that required reporting can be made.
- E. In the event of accidental spill or overflow, the Contractor is responsible for any damages that may have occurred to public or private property including cleaning, disinfection, and other corrections to the satisfaction of the Engineer at no cost to the Owner.

3.2 INSTALLATION AND REMOVAL

- A. The Contractor shall pipe sections or make connections to the existing sewer and discharge forcemain and construct temporary bypass pumping structures only at the locations indicated on the Drawings or in the approved Bypass Pumping Plan, and as may be required to provide an adequate suction and discharge conduit, unless otherwise approved by the Owner and Engineer.
- B. As necessary, plugging or blocking of wastewater flows shall be performed with the use of approved plugs for gravity pipes and with the use of LineStops and/or Insert Valves on force mains which shall be installed by contractors approved by the Owner. When plugging or blocking is no longer needed for performance of the work, the plugs shall be removed in a manner that permits the wastewater flow to slowly return to normal without surge, surcharging, or causing other major disturbances downstream.
- C. The installation of the bypass pipelines is prohibited in all wetland or ditch areas.
- D. At the conclusion of the bypass pumping operations, when all of the modifications to the lift station are complete, tested, and ready for operation, the Contractor shall demonstrate the new system in automatic mode for 72 hours. At the completion of the demonstration period, and upon receipt of Engineer's written approval, the Contractor shall remove all the piping and bypass pumping equipment, restore all property to pre-construction condition and restore all pavement.

3.3 QUALITY CONTROL AND MAINTENANCE

- A. Testing: Contractor shall perform leakage and pressure tests of the bypass pumping discharge piping using clean water prior to actual operation. The Engineer and Owner shall be given 24 hours notice prior to testing.
- B. Inspection: Contractor shall inspect the bypass pumping system a minimum of twice daily, typically at the beginning and end of the work day, to ensure that the system is working correctly.

- C. Maintenance Service: Contractor shall insure that the temporary bypass pumping system is properly maintained and a responsible operator shall inspect the bypass pumping equipment a minimum of once daily during all times when pumps are operating.
- D. Monitoring: The Contractor shall be responsible for monitoring the bypass operations 24 hours per day, 7 days per week. All electronic monitoring must be detailed in the comprehensive written Bypass Pumping Plan and approved by the Owner and Engineer.
- E. Extra Materials: Spare parts for pumps and piping shall be kept on site as required. Adequate hoisting equipment for each pump and accessories shall be maintained on the site. Adequate diesel fuel storage for pumps shall be provided to maintain constant operations of the pumps.

3.4 SEQUENCE OF CONSTRUCTION

- A. Contractor shall thoroughly familiarize itself with all constraints of maintaining operations of the sewer facilities. Contractor shall propose a Sequence of Construction incorporating these constraints and secure concurrence of the Owner and Engineer prior to starting work.
- B. The Contractor shall submit a construction plan and schedule, which details the interruptions to be made which the Contractor shall be fully responsible for. One week prior to connections being made to existing structures or pipes, a coordination meeting shall be held between the Contractor, Engineer, and Owner to discuss the approved construction plan.
- C. Schedule of construction, interconnecting details, and other revisions necessary for proper interfacing of the Work shall be subsequently modified by Contractor accounting for results of said coordination meeting. The Engineer and Owner shall be notified 24 hours prior to any actual interruptions or connections being made. No bypassing operations shall begin prior to securing the Owner's approval of respective connection plan and work schedule.
- D. Temporary Bypass Pumping System Requirements:
 - 1. Contractor shall provide air and vacuum release valve on suction piping to bleed off trapped air.
 - 2. Temporary bypass pump operations and equipment shall include installation of isolation and check valves.
 - 3. Install pressure gauge on pump discharge header and pressure and/or vacuum gauge on suction header. Gauges shall have isolation valves and diaphragm seals.
 - 4. Demonstrate the bypass pumping system by running it in automatic mode for 72 hours for bypassing operations at pump stations. If the system operates successfully during this period, the existing pumps can be removed from

service. If the system does not operate successfully, make repairs/modifications and restart the demonstration period.

5. Provide temporary lighting in the yard for pump maintenance, service, and operation at night, as necessary.

END OF SECTION

SECTION 02970
SANITARY SEWER CURED-IN-PLACE PIPE (CIPP)

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Rehabilitation of sanitary sewer by CIPP Method.
- B. Connect to existing manholes.
- C. Video observation.
- D. Equipment.
- E. Sewer service connection.
- F. Bypassing sewage.

1.2 RELATED SECTIONS

- A. Section 02640 – Sewer System Construction
- B. Section 02955 – Sewer Line Cleaning and CCTV Inspection
- C. Section 02960 – Sanitary Sewer Manhole Rehabilitation
- D. Section 02975 – Sanitary Sewer Pipe Bursting

1.3 OPTIONS

- A. The specifications describe several materials. Where manufacturers and models of equipment are named in the specifications, it is intended these are to describe quality and function required. **The Contractor may use equipment or materials of other manufacturers provided they are reviewed and accepted by Engineer and Owner as equivalent to those specified.**

1.4 REFERENCES (Latest Revision)

- A. ASTM D 790 – Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- B. ASTM D 5813 – Cured-In-Place Thermosetting Resin Sewer Piping Systems.
- C. ASTM E 329 – Agencies Engaged in Construction Inspection, Testing, or Special Inspection.
- D. ASTM F 1216 – Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube.

- E. ASTM F 1743 – Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe. (CIPP)

1.5 MEASUREMENT AND PAYMENT

- A. Cured-in-Place Pipe – Measurements will be made between the centers of manholes or to other pipe ends. Payment will be made at the contract unit price per linear foot of cured-in-place pipe for each pipe diameter, and shall include cost of labor, material, equipment, cleaning, video re-observation at 11 months post construction, preparation of existing pipe, service lateral connection reinstatement, sewer bypassing operations, and performance of all operations necessary to complete rehabilitation of all designated sewer pipes using cured-in-place pipe method.
- B. Traffic Control – Separate payment will not be made for traffic control operations necessary for the project. The cost of traffic control operations shall be included in the appropriate unit price item and shall include cost of all traffic operations necessary to adhere to the SCDOT standards and project SCDOT Encroachment Permit.

1.6 QUALITY ASSURANCE

- A. Contractor will furnish the Engineer and Owner a description of all material before ordering. The Engineer will review Contractor's submittals and provide in writing an acceptance or rejection of material.
- B. For a product to be considered, a minimum of 200,000 linear feet or 200 manhole-to-manhole line sections of successful wastewater collection system installations in the U.S. must be documented to satisfaction of Owner and Engineer. At least 50,000 linear feet of the product shall have been in successful service for a minimum of five years.
- C. For an installer to be considered, the installer must satisfy all insurance, financial, and bonding requirements of Owner, and must have had at least two (2) years active experience in commercial installation of product bid. In addition, the installer must have successfully installed at least 50,000 feet of product bid in wastewater collection systems. Acceptable documentation of these minimum installations must be submitted to the Owner and Engineer.
- D. Sewer rehabilitation products submitted for acceptance must provide a current (within last year) third party test results supporting the long-term performance and structural strength of product, and such data shall be satisfactory to Owner and Engineer. Test samples shall be prepared to simulate installation methods and trauma of the product. No product will be accepted without independent third-party testing verification.
- E. Devices, equipment, structures, and systems not designated by Engineer which the Contractor wishes to furnish shall be designed by either a Registered Professional Engineer or by someone Engineer accepts as qualified. If required, complete design calculations and assumptions shall be furnished to the Engineer or Owner before acceptance.
- F. Tests shall be taken by a testing laboratory operating in accordance with ASTM E329 and shall be acceptable to the Engineer prior to engagement. Mill certificates of tests on

materials made by manufacturers will be accepted provided a manufacturer maintains an adequate testing laboratory, makes regularly scheduled tests which are spot checked by an outside laboratory, and furnishes satisfactory certificates with name of the one making test.

1.7 PRODUCT DELIVERY, STORAGE & HANDLING

- A. Material shall be unloaded in a manner avoiding damage and shall be stored where it will be protected and will not be hazardous to traffic. If stored on private property, Contractor shall obtain permission from the property owner and shall repair any damage caused by storage. Material shall be examined before installation and neither damaged nor deteriorated material shall be used in the work.

1.8 JOB CONDITIONS

- A. The installation of cured-in-place pipe must be coordinated with other work on site. Contractor shall replace or repair any materials or structures damaged through the course of its work.
- B. Contractor shall conform with all local, state, and federal regulations including those set forth by OSHA, RCRA and the EPA and any other applicable authorities.
- C. It is the responsibility of the Contractor to determine if field conditions are suitable for the work required, including soil conditions, prior to any cleaning, CIPP work, or any bypass pumping. Loose soils may be present near access points (including manholes), and it is the responsibility of the Contractor to prevent displacement of these sorts throughout the entire course of the work. In the event of any sinkholes, it is the responsibility of the Contractor to fully repair the area and restore the entire area to its previous condition.

1.9 SEQUENCING AND SCHEDULING

- A. Contractor shall arrange work so rehabilitated sewer lines and reinstated laterals are placed back in service as soon as reasonable after the cured-in-place pipe is installed.

1.10 ALTERNATIVES

- A. The intention of these specifications is to produce the best system for the Owner. If Contractor suggests alternate material, equipment or procedures will improve results at no additional cost, Engineer and Owner will examine the suggestion, and if it is accepted, it may be used. Basis upon which acceptance of an alternate will be given is its value to the Owner, and not for convenience of Contractor.

1.11 GUARANTEE

- A. Contractor shall guarantee the quality of materials, equipment, and workmanship for 12 months after acceptance of completed Project. Defects discovered during this period shall be repaired by Contractor at no cost to the Owner.
- B. Contractor shall re-video 20% of the cured-in-place rehabilitated pipeline between ten (10) and eleven (11) months from date of final acceptance. If more than 30% of repaired pipe

shows failures, Contractor shall replace all of the cured-in-place pipe.

1.12 EXISTING UTILITIES

- A. All known Town of Ridgeland utility facilities are shown schematically on the construction drawings and are not necessarily accurate in location as to plan or elevation. Utilities such as service lines or unknown facilities not shown will not relieve the Contractor of responsibility under this requirement. Contractor will be held responsible for cost of repairs to damaged underground facilities, even when such facilities are not shown on the drawings.
- B. The Contractor shall call for underground utility locations before starting work. Underground utilities location service can be contacted at (888) 721-7877 (SC) or 811.

1.13 TESTING

- A. Chemical Resistance – CIPP shall meet the chemical resistance requirements of ASTM F1216, Appendix X2. CIPP samples for testing shall be of tube and resin system similar to materials proposed for actual construction. It is required CIPP samples with and without plastic coating meet these chemical testing requirements.
- B. CIPP Field Samples – Contractor shall submit test results from field installations in the USA of same resin system and tube materials as proposed for actual installation. These test results must verify the CIPP physical properties specified in Paragraph 2.3 E have been achieved in previous field applications. Samples for this project shall be made and tested as described in the following paragraph.

CIPP samples shall be prepared and physical properties tested in accordance with ASTM F1216 or ASTM F1743, Section 8, using either method proposed. The flexural properties must meet or exceed values listed in Table 1 of applicable ASTM.

- C. Testing laboratory shall operate in accordance with ASTM E 329 and be acceptable to the Engineer.
- D. Testing laboratory and Project Engineer/Project Representative shall be given a minimum of 48 hours notice prior to taking any of the tests.
- E. Testing shall be the responsibility of the Contractor and shall be performed at Contractor's expense by a commercial testing laboratory operating in accordance with subparagraph C above.
- F. Test results shall be furnished to the Engineer prior to continuing with associated or subsequent work.

PART 2 – PRODUCTS

2.1 MANUFACTURER

- A. All tubing and resin used shall be manufactured by Insituform, or approved equal.

2.2 TUBE

- A. Tube – The tube shall consist of one or more layers of absorbent non-woven felt fabric and meet requirements of ASTM F1216 or ASTM F1743, Section 5. The tube shall be constructed to withstand installation pressures, have sufficient strength to bridge missing pipe, and stretch to fit irregular pipe sections.
1. The wet out tube shall have a uniform thickness when compressed at installation pressures and will meet or exceed the design thickness.
 2. The tube shall be manufactured to a size when installed will tightly fit internal circumference and length of original pipe. Allowance should be made for circumferential stretching during inversion. Overlapped layers of felt in longitudinal seams causing lumps in the final product shall not be utilized.
 3. The outside layer of tube (before wet out) shall be coated with an impermeable, flexible membrane containing resin, and facilitate monitoring of resin saturation during resin impregnation (wet out) procedure.
 4. The tube shall be homogeneous across entire wall thickness containing no intermediate or encapsulated elastomeric layers. No material shall be included in the tube which may cause delamination in cured CIPP. No dry or unsaturated layers shall be evident.
 5. Seams in tube shall be stronger than the non-seamed felt.
 6. The outside of tube shall be marked for distance at regular intervals along its entire length, not to exceed five (5) feet. Such markings shall include the manufacturer's name or identifying symbol.

2.3 RESIN

- A. Resin – The resin system shall be a corrosion resistant polyester, vinyl ester, or epoxy and catalyst system. When properly cured within the tube composite, resin shall meet requirements of ASTM F1216, ASTM F1743, and ASTM D 5813, physical properties herein, and those being utilized in design of CIPP for this project. The resin shall produce CIPP complying with structural and chemical resistance requirements of this specification.
- B. A dye compatible with the resin and tube fabric shall be added to resin to facilitate monitoring of resin saturation during resin impregnation (wet out) procedure.

2.4 STRUCTURAL REQUIREMENTS

- A. The CIPP shall be designed as per ASTM F1216, Appendix X.1. CIPP design shall assume no bonding to the original pipe wall.
- B. Contractor must have performed long-term testing for flexural creep of the CIPP pipe material installed by its company. Such testing results are to be used to determine the Long-term, time dependent flexural modulus to be utilized in product design. This is a performance test of materials (tube and resin) and general workmanship of the installation and curing. A percentage of the instantaneous flexural modulus value (as measured by ASTM D-790 testing) will be used in design calculations for external buckling. The percentage, or long-term creep retention value utilized, will be verified by this testing. Values in excess of 50% will not be applied unless substantiated by qualified third-party test data. Materials utilized for the contracted project shall be of a quality equal to or better than materials used in long-term test with respect to initial flexural modulus used in design.
- C. The Enhancement Factor ‘K’ to be used in ‘Partially Deteriorated’ design conditions shall be assigned a value of 7. Application of Enhancement (K) Factors in excess of 7 shall be substantiated through independent test data.
- D. The layers of cured CIPP shall be uniformly bonded. It shall not be possible to separate any two layers with a probe or point of a knife blade, so layers separate cleanly, or probe or knife blade moves freely between the layers. If separation of layers occurs during testing of field samples, new samples will be cut from the work. Any reoccurrence may cause rejection of the work.
- E. The cured pipe material (CIPP) shall conform to the structural properties, as listed below.

MINIMUM PHYSICAL PROPERTIES

<u>Property</u>	<u>Test Method</u>	<u>Cured Composite min. per ASTM F1216</u>	<u>Cured Composite (400,000 psi Resin)</u>
Modulus of Elasticity	ASTM D-790 (short term)	250,000 psi	400,000 psi
Flexural Stress	ASTM D-790	4,500 psi	4,500 psi

- F. Required structural CIPP wall thickness shall be based as a minimum, on physical properties in Paragraph E and in accordance with design equations in appendix of ASTM F 1216, and the following design parameters:

Design Safety Factor	= <u>2.0</u>
Retention Factor for Long-Term Flexural Modulus to be used in Design <i>(as determined by Long-Term tests described in paragraph B)</i>	= <u>1% – 60%</u>
Ovality*	= <u>2%</u>

Enhancement Factor, K	= <u>See Paragraph C</u>
Groundwater Depth (above invert)*	= <u>ft.</u>
Soil Depth (above crown)*	= <u>ft.</u>
Soil Modulus**	= <u>PSI</u>
Soil Density**	= <u>120 pcf</u>
Live Load**	= <u>H20 Highway</u>
Design Condition (partially or fully deteriorated)***	= <u>***</u>

* Denotes information which can be provided here or in observation video recordings or project construction plans. Multiple line segments may require a table of values.

** Denotes information required only for fully deteriorated design conditions.

*** Based on review of video logs, conditions of pipeline can be fully or partially deteriorated.

(See ASTM F1216 Appendix.) The Engineer or Owner will be sole judge as to pipe conditions and parameters utilized in Design.

- G. Refer to the below tables for specific pipe section requirements for both partially deteriorated pipe and fully deteriorated pipe, based on pipe condition, depth, ovality, etc. as computed for conditions shown, using ASTM F 1216 design equations.

CIPP WALL THICKNESS PARTIALLY DETERIORATED DESIGN (PD)

		Required DR (D /			
		Ei = 250,000 psi		Ei = 400,000 psi	
		Ground Water Depth			
Ovality	Range of Depth to invert (feet)	50% Depth	Full Depth	50% Depth	Full Depth
2 % *	4 – 8	78	62	92	73
	8 – 12	69	55	80	64
	12 – 16	62	50	73	58
	16 – 20	58	46	68	54
	20 – 24	55	44	64	51
5 %	4 – 8	72	57	84	67
	8 – 12	63	50	73	58
	12 – 16	57	46	67	53
	16 – 20	53	42	62	49
	20 – 24	50	40	58	47
8 %	4 – 8	66	52	77	61
	8 – 12	58	46	67	54
	12 – 16	52	42	61	49
	16 – 20	49	39	57	45
	20 – 24	46	37	54	43

PD wall thickness varies with the height of groundwater above invert of host pipe. The table assumes height of groundwater equal to half or full depth to pipe invert. The table represents CIPP pipe wall

thickness for a host pipe range of 8 to 48 inches. This is a guideline only. Specific calculations should refer to ASTM F-1216, Appendix X.1.

FULLY DETERIORATED DESIGN (FD)

		Required DR (D /			
		Ei = 250,000 psi		Ei = 400,000 psi	
		Ground Water Depth			
Ovality	Range of Depth to invert (feet)	50% Depth	Full	50% Depth	Full
2 % *	4 – 8	49	43	58	51
	8 – 12	49	43	58	51
	12 – 16	44	39	52	46
	16 – 20	40	36	47	41
	20 – 24	37	33	44	38
5 %	4 – 8	41	37	48	43
	8 – 12	41	36	48	43
	12 – 16	37	33	44	38
	16 – 20	34	30	40	35
	20 – 24	31	27	37	32
8 %	4 – 8	35	31	40	36
	8 – 12	35	30	41	36
	12 – 16	31	27	37	32
	16 – 20	28	25	33	29
	20 – 24	26	23	31	27

FD wall thickness considers groundwater, soil, and live loads upon the CIPP pipe. The table assumes two heights of groundwater, 120-lbs/cu. ft. of soil density and an AASHTO H20 highway load. The table represents CIPP pipe wall thickness for a host pipe range of 8 to 48 inches. This is a guideline only. Specific calculations should refer to ASTM F-1216, Appendix X.1.

2.5 HYDRAULIC CAPACITY

- A. Overall, the hydraulic profile shall be maintained as large as possible. The CIPP shall have at least full flow capacity of original pipe before rehabilitation. Calculated capacities may be derived using a commonly accepted roughness coefficient for the existing pipe material taking into consideration its age and condition.

2.6 VIDEO EQUIPMENT

- A. Video equipment shall be in accordance with Section 02955, Sewer Line Cleaning and CCTV Inspection.

2.7 PRODUCT REVIEW

- A. Contractor shall provide the Engineer with a complete description of all products from

source suppliers before ordering. The Engineer will review all products before they are ordered by Contractor.

PART 3 – EXECUTION

3.1 CONSTRUCTION OBSERVATION

- A. The quality of CIPP installation shall be tested by Contractor under direction of Engineer. Engineer or Project Representative will have the right to require any portion of work be completed in their presence. However, if Contractor notifies the Engineer such work is scheduled and Engineer fails to appear within 48 hours, Contractor may proceed. All completed work and materials furnished shall be subject to review by the Engineer or Project Representative. All improper work shall be reconstructed. All materials not conforming to requirements of specifications shall be removed from the work upon notice being received from Engineer for rejection of such materials. Engineer shall have the right to mark rejected materials to distinguish them as such.

Contractor shall give the Project Engineer or Project Representative a minimum of 48 hours notice for all required observations or tests.

- B. Wall thickness of samples shall be determined as described in Paragraph 8.1.6 of ASTM F1743. Minimum wall thickness at any point shall not be less than 87-½% of the design thickness as calculated in Paragraph 2.4 F of this document.
- C. Visual observation of the CIPP shall be in accordance with ASTM F1216 and ASTM F1743, Section 8.6.

3.2 INSTALLATION

- A. It is the responsibility of the Contractor to determine if field conditions are suitable for the work required, including soil conditions, prior to any cleaning, CIPP work, or any bypass pumping. Loose soils may be present near access points (including manholes), and it is the responsibility of the Contractor to prevent displacement of these sorts throughout the entire course of the work. In the event of any sinkholes, it is the responsibility of the Contractor to fully repair the area and restore the entire area to its previous condition.
- B. It shall be the responsibility of Owner to locate and designate all manhole access points open and accessible for work, and provide rights of access to these points. If a street must be closed to traffic because of the orientation of a sewer, Contractor shall institute actions necessary to do this for mutually agreed time period, in accordance with all South Carolina Department of Transportation (SCDOT) standards and project permits. Owner shall also provide free access to fire hydrants for cleaning, inversion and other work items requiring water. Contractor shall provide equipment, hoses, and backflow prevention for obtaining water from fire hydrants.
- C. Cleaning of Sewer Lines:
1. Cleaning of Sewer Lines shall be conducted in accordance with Section 02955,

Sewer Line Cleaning and CCTV Inspection.

2. Contractor shall remove all internal debris out of the sewer line which will interfere with installation of CIPP. Contractor shall obtain a legal offsite disposal site for all debris removed from sewers during the cleaning operation. Any hazardous waste material encountered during this project will be considered as a changed condition. Contractor may also have the option to flush internal debris, with approval from Engineer and Owner, from the sewer down-stream, provided the waste is not hazardous or will not cause detriment to operations in any way to the existing wastewater collection and treatment systems.
- D. Bypassing Sewage – Contractor, when necessary, shall provide for the flow of sewage around section or sections of pipe designated for repair. Bypass shall be made by plugging a line at an existing upstream manhole and pumping the flow into a downstream manhole or adjacent system, as approved by Engineer and Owner. Pump and bypass lines shall be of adequate capacity and size to handle the flow. Owner shall require a detail of the bypass plan to be submitted for review and approval prior to any bypassing operations. One stand-by pump of equal capacity shall be provided during cleaning of gravity sewer pipes.
 - E. Observation of Pipelines – Shall be performed by experienced personnel trained in locating breaks, obstacles, and service connections by closed circuit television. Interior of the pipeline shall be carefully checked to determine location of any conditions preventing proper installation of CIPP into pipelines, and it shall be noted so these conditions can be corrected. A video and suitable log shall be kept for later reference by the Owner and Engineer.
 - F. Line Obstructions – It shall be the responsibility of Contractor to clear line of obstructions such as solids and roots preventing insertion of CIPP. If pre-installation observation reveals an obstruction such as a protruding service connection, dropped joint, or a collapse preventing the inversion process and it cannot be removed by conventional sewer cleaning equipment, Contractor shall make a point repair excavation to uncover and remove or repair obstruction. Such excavation shall be accepted in writing by the Engineer and Owner prior to commencement of work and shall be considered as a separate pay item.
 - G. Notification – Contractor shall make every effort to maintain service usage throughout duration of the project. In the event a sewer line or service lateral will be out of service, maximum amount of time of no service shall be eight (8) hours for any building or facility served by this section. Contractor is responsible for notifying the owner of the building or facility and informing when sewer will be off-line. Contractor shall also coordinate and inform the Owner and Engineer.
 - H. Installation procedures for CIPP shall conform to ASTM F1216 and the following requirements. The resin-impregnated tube shall be inverted into sewer by controlled steam or water pressure. Once inversion has started, the pressure required to hold tube tight against existing sewer shall be maintained between minimum and maximum pressures recommended by tube manufacturer until process is complete. Should pressure deviate from within the range of minimum and maximum pressures, installed tube shall be removed from existing sewer. The heat source shall be fitted with suitable monitors to gage temperature of steam or water. This gage shall be placed between impregnated tube and pipe invert at the termination point during cure. After initial cure is reached, the temperature

shall be raised to post-cure temperatures recommended by resin manufacturer. Once curing is complete, new pipe shall be cooled to a temperature below 100 degrees F before relieving the internal pressure. The finished pipe should be continuous over entire length of an inversion run and free of dry spots, lifts, and delaminations. If these conditions are present, remove and replace the CIPP.

- I. Service lateral connections covered by the CIPP are to be opened and reinstated without excavation using a hydraulic powered robotic cutting device, specifically designed for cutting CIPP. The lateral opening in CIPP shall be of same shape as original opening. If Contractor misses an opening with the cutter, tube shall be repaired at Contractor's expense.

3.3 FIELD TESTING

- A. After the existing sewer is completely repaired, internally check with television camera and video recording as required. Finished video recording shall be continuous over the entire length of sewer between two manholes.
- B. Defects, which may affect integrity or strength of pipe in the opinion of Engineer, shall be repaired or pipe replaced at Contractor's expense.
- C. For each inversion section, Contractor shall cut a sample from a section of cured CIPP at an intermediate manhole or termination point. Samples for each section shall be large enough to provide five specimens for flexural and tensile testing.

3.4 VIDEO OBSERVATION

- A. Video observation (C.C.T.V) of pipelines shall be performed in accordance with Section 02955, Sewer Line Cleaning and CCTV Inspection, by experienced personnel trained in locating breaks, obstacles, and service connections by closed circuit color television. Video observation shall include the following:
 - 1. Video recordings (post) to be submitted to the Engineer and Owner before final invoice.
 - 2. Video recordings to remain property of the Owner; Contractor to retain second copy for its use.
 - 3. All flows tributary to section of sewer being checked shall be completely by-passed around the section during observation if necessary.
 - 4. Provide post construction video recording upon completing reconstruction of each section of sewer with voice description and stationing of services. Data and stationing to be on video.
 - 5. Should any portion of video recordings be of inadequate quality or coverage, as determined by Owner or Engineer, Contractor will have the portion re-checked and video recorded at no additional expense to Owner.

3.5 BYPASSING SEWAGE

- A. Bypass Pumping – The Contractor shall provide diversion for cured-in-place pipe process. A minimum of two (2) bypass pumping units (one (1) operating, one (1) standby) of equal capacity shall be present and ready to operate on site at all times while repair work is in progress. The pumps and bypass lines shall be of adequate capacity and size to handle all flows.
- B. Contractor shall be responsible for continuity of sanitary sewer service to each facility connected to the section of sewer during execution of work.
- C. If sewage backup occurs and enters buildings, the Contractor shall be responsible for clean-up, repair, property damage cost and claims, regulatory fines, and any required monitoring at no additional cost to Owner.

3.6 CLEAN-UP

- A. Upon acceptance of the installation work and testing, Contractor shall restore project area affected by operations, equal to prior conditions.

3.7 ACCEPTANCE OF PORTIONS OF THE WORK

- A. Owner reserves the right to accept and use any portion of work. Engineer shall have power to direct the Contractor's efforts regarding which the order of the rehabilitation segments.

END OF SECTION 02970

SECTION 02975
SANITARY SEWER PIPE BURSTING

PART 1 - GENERAL

1.1 SCOPE OF WORK: This specification addresses the installation of sewer mains by the pipe bursting method, including connecting to existing sewer mains, connecting to existing services or installing house connections. The Contractor will furnish all labor, equipment, materials, tools and appurtenances necessary or proper for the performance and completion of the contract. Inspection and payment will be by the method stipulated in the contract.

1.2 DEFINITIONS

- A. Pipe Bursting: Method of trenchless construction in which a bursting tool splits/fractures the existing pipe while simultaneously installing a new Polyethylene Pipe of the same size or larger using a Static or Pneumatic Pipe Bursting Technique.
- B. Engineer: Overall project engineer employed or retained by the Owner.
- C. Owner: Municipal utility authority, sewer district or private owner of the sewer system.
- D. Contractor: Firm engaged in the construction of underground utility lines and with demonstrated competency using pipe bursting methods for the installation of sewer pipelines.

1.3 RELATED SECTIONS

- A. Section 02640 – Sewer System Construction
- B. Section 02955 – Sewer Line Cleaning and CCTV Inspection
- C. Section 02960 – Sanitary Sewer Manhole Rehabilitation
- D. Section 02970 – Sanitary Sewer Cured in Place Pipe

1.4 OPTIONS

- A. The specifications describe several materials. Where manufacturers and models of equipment are named in the specifications, it is intended these are to describe quality and function required. **The Contractor may use equipment or materials of other manufacturers provided they are reviewed and accepted by Engineer and Owner as equivalent to those specified.**

1.5 REFERENCES (Latest Revision)

- A. ASTM F714 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based

on Outside Diameter

- B. ASTM D1248 - Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable
- C. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
- D. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, $\frac{3}{4}$ inch (19 mm) through 3 inch (76 mm), for water service
- E. AWWA C906 – Polyethylene (PE) Pressure Pipe and Fittings, 4 Inch through 65 Inch (100 mm through 1,650 mm) for Waterworks
- F. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter
- G. ASTM E3261 - Butt Heat Fusion Polyethylene Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
- H. ASTM F2620 - Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings.
- I. ASTM E 329 – Agencies Engaged in Construction Inspection, Testing, or Special Inspection.

1.6 MEASUREMENT AND PAYMENT

- A. Pipe Bursting – Measurements will be made between the centers of manholes or to other pipe ends. Payment will be made at the contract unit price per linear foot of pipe bursting for each pipe diameter, and shall include cost of labor, material, equipment, cleaning, pipe joining, video re-observation at 11 months post construction, preparation of existing pipe, sewer bypassing operations, piping installation and anchor and seal at manhole, and performance of all operations necessary to complete rehabilitation of all designated sewer pipes using pipe bursting method.
- B. Sewer Lateral Reconnection – Measurement will be made for each sewer service lateral connection restored to the completed HDPE pipe burst main at the contract unit price per each. Such payment shall include cost of labor, material, and equipment to excavate and identify lateral, prepare for pipe bursting operations, install fitting for connection, restore connection between sewer lateral and gravity main, backfill and compact, and complete connection to restore operation.
- C. Traffic Control – Separate payment will not be made for traffic control operations necessary for the project. The cost of traffic control operations shall be included in the appropriate unit price item and shall include cost of all traffic operations necessary to adhere to the SCDOT standards and project SCDOT Encroachment Permit.

1.7 QUALITY ASSURANCE

- A. Contractor will furnish the Engineer and Owner a description of all material before ordering. The Engineer will review Contractor's submittals and provide in writing an acceptance or rejection of material.
- B. For a product to be considered, a minimum of 200,000 linear feet or 200 manhole-to-manhole line sections of successful wastewater collection system installations in the U.S. must be documented to satisfaction of Owner and Engineer. At least 50,000 linear feet of the product shall have been in successful service for a minimum of five years.
- C. For an installer to be considered, the installer must satisfy all insurance, financial, and bonding requirements of Owner, and must have had at least two (2) years active experience in commercial installation of product bid. In addition, the installer must have successfully installed at least 50,000 feet of product bid in wastewater collection systems. Acceptable documentation of these minimum installations must be submitted to the Owner and Engineer.
- D. Devices, equipment, structures, and systems not designated by Engineer which the Contractor wishes to furnish shall be designed by either a Registered Professional Engineer or by someone Engineer accepts as qualified. If required, complete design calculations and assumptions shall be furnished to the Engineer or Owner before acceptance.
- E. Tests shall be taken by a testing laboratory operating in accordance with ASTM E329 and shall be acceptable to the Engineer prior to engagement. Mill certificates of tests on materials made by manufacturers will be accepted provided a manufacturer maintains an adequate testing laboratory, makes regularly scheduled tests which are spot checked by an outside laboratory, and furnishes satisfactory certificates with name of the one making test.
- F. Field Supervisory Personnel employed by the Pipe Bursting Contractor will have at least two (2) years of documented experience in the performance of the work and tasks as stated in the contract documents.

1.8 PRODUCT DELIVERY, STORAGE & HANDLING

- A. Material shall be unloaded in a manner avoiding damage and shall be stored where it will be protected and will not be hazardous to traffic. If stored on private property, Contractor shall obtain permission from the property owner and shall repair any damage caused by storage. Material shall be examined before installation and neither damaged nor deteriorated material shall be used in the work.

1.9 JOB CONDITIONS

- A. The installation of HDPE piping by pipe bursting method must be coordinated with other work on site. Contractor shall replace or repair any materials or structures damaged through the course of its work.
- B. Contractor shall conform with all local, state, and federal regulations including those set forth by OSHA, RCRA and the EPA and any other applicable authorities.

- C. It is the responsibility of the Contractor to determine if field conditions are suitable for the work required, including soil conditions, prior to any cleaning, pipe bursting work, or any bypass pumping. Loose soils may be present near access points (including manholes), and it is the responsibility of the Contractor to prevent displacement of these sorts throughout the entire course of the work. In the event of any sinkholes, it is the responsibility of the Contractor to fully repair the area and restore the entire area to its previous condition.

1.10 SEQUENCING AND SCHEDULING

- A. Contractor shall arrange work so rehabilitated sewer lines and reinstated laterals are placed back in service as soon as reasonable after the HDPE pipe is installed.

1.11 ALTERNATIVES

- A. The intention of these specifications is to produce the best system for the Owner. If Contractor suggests alternate material, equipment or procedures will improve results at no additional cost, Engineer and Owner will examine the suggestion, and if it is accepted, it may be used. Basis upon which acceptance of an alternate will be given is its value to the Owner, and not for convenience of Contractor.

1.12 GUARANTEE

- A. Contractor shall guarantee the quality of materials, equipment, and workmanship for 12 months after acceptance of completed Project. Defects discovered during this period shall be repaired by Contractor at no cost to the Owner.
- B. Contractor shall re-video 20% of the pipe burst installed pipeline between ten (10) and eleven (11) months from date of final acceptance. If more than 30% of repaired pipe shows failures, Contractor shall replace all of the pipe burst installed HDPE pipe.

1.13 EXISTING UTILITIES

- A. All known Town of Ridgeland utility facilities are shown schematically on the construction drawings and are not necessarily accurate in location as to plan or elevation. Utilities such as service lines or unknown facilities not shown will not relieve the Contractor of responsibility under this requirement. Contractor will be held responsible for cost of repairs to damaged underground facilities, even when such facilities are not shown on the drawings.
- B. The Contractor shall call for underground utility locations before starting work. Underground utilities location service can be contacted at (888) 721-7877 (SC) or 811.

1.14 SUBMITTALS

- A. The Contractor shall submit the following for review and approval:
 - 1. Documentation showing that personnel have two (2) years of Pipe Bursting experience with a list of a minimum 50,000 LF installed by the company including three (3) sewer main projects similar or greater in scope and value to

the project specified in the contract documents. Information for each supervisor and the company must include, but not be limited to, date of work, location, pipe information (i.e., length, diameter, depth of installation, pipe material, etc.), project owner information, (i.e., name, address, and telephone number, contact person).

2. Drawings and documents:
 - a. Shop drawings, catalog data, and manufacturer's technical data showing complete information on material composition, physical properties, and dimensions of new pipe and fittings. Include manufacturer's recommendations for handling, storage, and repair of pipe and fittings damaged.
 - b. Certifications of personnel involved in HDPE Butt Fusion Welding.

PART 2 - PRODUCTS

2.1 HDPE PIPE

- A. Polyethylene Plastic Pipe shall be High Density Polyethylene Pipe (HDPE) and meet applicable requirements of ASTM F714.
- B. HDPE pipe and fittings will be used in accordance with the material specifications. All additional appurtenances (manholes, tees, gaskets, etc.) will meet the material specifications. All pipe installed by pipe bursting will be joined by butt fusion, electro fusion, or full circle repair clamp as detailed in this Section.
- C. HDPE pipe will be produced from resins meeting the requirements of ASTM D1248, designation PE3408, ASTM D3350 cell classification PE345444C, and will meet the requirements of AWWA C901 and C906. HDPE pipe will meet the minimum stability requirements of ASTM D3350. Pipe will be legibly marked at intervals of no more than five feet with the manufacturer's name, trademark, pipe size, HDPE cell classification, appropriate legend such as SDR 19 or SDR 17, ASTM D3035, AWWA C901 or C906, date of manufacture and point of origin.
- D. All pipe shall be made of virgin material. No rework material except that obtained from the manufacturers own production of the same formulation shall be used.
- E. The pipe shall be homogeneous throughout and shall be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.
- F. Pipe color shall be solid black unless otherwise specified in these contract documents.
- G. HDPE Pipe shall be Iron Pipe Size (IPS) unless otherwise specified in these contract documents.

- H. Dimension Ratios: The minimum wall thickness of the HDPE pipe shall meet the following;

Minimum DR
DR 19 or DR 17

2.2 PIPE JOINING FOR TERMINAL SECTIONS OF HDPE PIPE

- A. The polyethylene pipe shall be assembled and joined at the site using the butt-fusion method to provide a leak proof joint. Threaded or solvent-cement joints and connections are not permitted. All equipment and procedures used shall be in strict compliance with the manufacturer's recommendations. Fusing shall be accomplished by personnel certified as fusion technicians by a manufacturer of polyethylene pipe and/or fusing equipment.
- B. Terminal sections may also be joined by Electrofuse Couplings by Central Plastic Company, Friatec, or approved equal.

2.3 MATERIALS RELATED TO SEWER SERVICE CONNECTIONS

- A. Sewer service connections to the HDPE main may be made by Plastic Saddles with Stainless Steel Straps, by GPK or approved equal or Rubber Saddles with Stainless Steel Straps by Fernco Company, DFW, or approved equal.
- B. Sewer service connections to the main may also be made with Electrofusion Saddles by Central Plastics, Friatec, or approved equal.
- C. Sewer service connections to the main may also be made with Inserta Tees by Fowler Manufacturing.

2.4 MATERIALS FOR SEALING MANHOLES

- A. The annular space at each manhole shall be sealed with a water stop gasket by Fernco Company or approved equal and finished with a quick setting grout.

2.5 EQUIPMENT

- A. The pipe bursting unit shall be designed and manufactured to force its way through the existing line by fracturing the pipe and compressing the broken pieces into the surrounding soil as the equipment progresses. The bursting unit shall generate sufficient force to burst and compact the existing pipeline. In each case the pipe bursting unit shall pull the polyethylene pipe with it as it moves forward.

PART 3 - EXECUTION

3.1 GENERAL

- A. Insertion and receiving points shall be existing manholes unless existing conditions are insufficient for equipment and piping. Any proposed insertion or receiving pits must be approved by Engineer and Owner.
- B. Insertion point shall be of sufficient length to allow the bursting head and new HDPE pipe to enter the host pipe at an angle that will maintain the grade of the existing sanitary sewer.
- C. Notification – Contractor shall make every effort to maintain service usage throughout duration of the project. In the event a sewer line or service lateral will be out of service, maximum amount of time of no service shall be eight (8) hours for any building or facility served by this section. Contractor is responsible for notifying the owner of the building or facility and informing when sewer will be off–line. Contractor shall also coordinate and inform the Owner and Engineer.

3.2 BYPASSING SEWAGE

- A. Bypass Pumping – The Contractor shall provide diversion for pipe bursting process. A minimum of two (2) bypass pumping units (one (1) operating, one (1) standby) of equal capacity shall be present and ready to operate on site at all times while repair work is in progress. The pumps and bypass lines shall be of adequate capacity and size to handle all flows. All costs for bypass pumping shall be incidental and are included in the pipe bid item(s).
- B. Contractor shall be responsible for continuity of sanitary sewer service to each facility connected to the section of sewer during execution of work.
- C. If sewage backup occurs and enters buildings, the Contractor shall be responsible for clean–up, repair, property damage cost and claims, regulatory fines, and any required monitoring at no additional cost to Owner.

3.3 PREPARATION

- A. All sewer service connections shall be located prior to pipe bursting the main by the Pre-Construction CCTV Inspection as required per Section 02955.
- B. If the Pre-Construction CCTV inspection reveals obstructions or pipe materials that will prevent the existing pipe from being pipe burst properly and cannot be removed by conventional cleaning equipment, a point repair will be made by the Contractor, with approval from the Owner/Engineer. Separate payment for this work will be made and it is not considered incidental to the pipe bursting process.
- C. If the Pre-Construction CCTV inspection reveals a significant sag or hump, a sag or hump removal (point repair) will be made by the Contractor, with approval from the Owner/Engineer. Separate payment for this work will be made and it is not considered

incidental to the pipe bursting process.

- D. Before any excavation is done for any purposes, the Contractor shall contact the appropriate One Call agency for determining field locations of existing utilities as described in paragraph 1.13.

3.4 INSERTION OF THE HDPE PIPE

- A. The polyethylene pipe shall be assembled and joined at the site using the butt-fusion method to provide a leak proof joint. Threaded or solvent-cement joints and connections are not permitted. All equipment and procedures used shall be in compliance with the manufacturer's recommendations. Fusing shall be accomplished by personnel certified as fusion technicians by a manufacturer of HDPE pipe and/or fusing equipment.
- B. The butt-fused joint shall be in true alignment and shall have uniform rollback beads resulting from the use of proper temperature and pressure. The joint shall be allowed adequate cooling time in accordance with fusion equipment manufacturer's instructions and recommendations before removal of pressure. The fused joint shall be watertight and shall have tensile strength equal to that of the pipe. All defective joints shall be cut out and replaced at the expense of the Contractor.
- C. Service connections to the HDPE pipe shall be made with materials submitted and approved in accordance with Paragraph 2. Products.
- D. An appropriate relaxation period shall be allowed prior to making service connections and connecting to manholes. The relaxation period shall be appropriate with and dependent upon site conditions, as determined by Contractor.
- E. If concrete encasements are encountered, a point repair shall be performed to excavate and break out concrete prior to the bursting operation to allow the steady and free passage of the pipe bursting head, with approval from the Owner/Engineer. Separate payment for this work will be made and it is not considered incidental to the pipe bursting process.
- F. The new HDPE pipe shall be inserted immediately behind the bursting head in accordance with the manufacturer's recommended procedures. The bursting tool shall be specifically designed and manufactured for the type of insertion process being used. It shall be utilized to guide and assist the bursting head during the operation. A pushing machine may be utilized to aid pipe insertion from the rear.
- G. New HDPE pipe shall extend a minimum of 6-inches into each manhole. The annular space shall be sealed at each manhole with a Water Stop Gasket (as described in Paragraph 2.4 and finished with a quick setting grout.

3.5 SERVICE RECONNECTIONS

- A. Service connections to the HDPE pipe shall be made with materials submitted and approved in accordance with Paragraph 2.3. Services shall be reconnected so as to minimize disruption of service.
- B. After the new HDPE pipe has been installed and tested, the Contractor shall be responsible for reconnecting existing sewer services in the manner described in the bid form. All service lines shall be the size indicated in the plans and specifications.

3.6 TESTING AND ACCEPTANCE

- A. After the new HDPE pipe is installed and all services are reconnected, the line shall be inspected by CCTV (Post-Construction CCTV).
- B. Video Observation
 - 1. Video observation (C.C.T.V) of pipelines shall be performed in accordance with Section 02955, Sewer Line Cleaning and CCTV Inspection, by experienced personnel trained in locating breaks, obstacles, and service connections by closed circuit color television. Video observation shall include the following:
 - a. Video recordings (post) to be submitted to the Engineer and Owner before final invoice.
 - b. Video recordings to remain property of the Owner; Contractor to retain second copy for its use.
 - c. All flows tributary to section of sewer being checked shall be completely by-passed around the section during observation if necessary.
 - d. Provide post construction video recording upon completing reconstruction of each section of sewer with voice description and stationing of services. Data and stationing to be on video.
 - e. Should any portion of video recordings be of inadequate quality or coverage, as determined by Owner or Engineer, Contractor will have the portion re-checked and video recorded at no additional expense to Owner.

END OF SECTION 02975

SECTION 005500
MISCELLANEOUS METALS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and install all miscellaneous metal complete as specified herein.

1.2 SUBMITTALS

- A. Submit to the Engineer, in accordance with Division 01 – General Requirements and Section 01340 - Submittals showing materials of construction and details of installation for:
 - 1. Shop drawings, showing sizes of members, method of assembly, anchorage and connection to other members.
 - 2. Specific instructions for concrete anchor installation, including drilled hole size, preparation, placement, procedure, and instructions for safe handling of anchoring systems.
- B. Samples
 - 1. Submit samples as requested by the Engineer during the course of construction.
- C. Design Data
 - 1. Submit calculations or test data demonstrating that any railings will resist the loads specified in the South Carolina Building Code at the post spacing provided.
 - 2. Submit manufacturer's load and deflection tables for grating.
- D. Test Reports
 - 1. Current test data or ICC Evaluation Report for concrete and masonry drilled anchors.
 - 2. Passivation method for stainless steel members.
- E. Certificates
 - 1. Submit certification that any railing systems are in compliance with OSHA requirements and the South Carolina Building Code.
 - 2. Submit certificates that welders have been qualified under AWS, within the previous 12 months, to perform the welds required under this Section.

1.3 REFERENCE STANDARDS

- A. Aluminum Association (AA)
 - 1. AA M31C22A41
 - a. M31: Mechanical Finish, Fine Satin

- b. C22: Finish, Medium Matte
- c. A41: Clear Anodic Coating, Class I

B. American Society for Testing and Materials (ASTM)

1. ASTM A36 - Standard Specification for Carbon Structural Steel.
2. ASTM A48 - Standard Specification for Gray Iron Castings.
3. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
4. ASTM A108 - Standard Specification for Steel Bars, Carbon, Cold Finished, Standard Quality.
5. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
6. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
7. ASTM A167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
8. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes.
9. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
10. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
11. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
12. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
13. ASTM A536 - Standard Specification for Ductile Iron Castings.
14. ASTM A1008 - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
15. ASTM A1011 - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
16. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
17. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
18. ASTM B429 - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.

- C. American Iron and Steel Institute (AISI).
 - 1. Specification for Structural Steel Buildings.
- D. American Welding Society (AWS)
 - 1. AWS D1.1 - Structural Welding Code Steel.
 - 2. AWS D1.2 - Structural Welding Code – Aluminum
 - 3. AWS D1.6 - Structural Welding Code - Stainless Steel
- E. Federal Specifications
 - 1. FS-FF-B-575C - Bolts, Hexagonal and Square
- F. Occupational Safety and Health Administration (OSHA)
- G. South Carolina Building Code. (FBC)
- H. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.4 QUALITY ASSURANCE

- A. The work of this Section shall be completely coordinated with the work of other Sections. Verify, at the site, both the dimensions and work of other trades adjoining items of work in this Section before fabrication and installation of items herein specified.
- B. Furnish to the pertinent trades all items included under this Section that are to be built into the work of other Sections.
- C. All welding shall be performed by AWS certified welders. Welding of steel shall conform to AWS D1.1, welding of aluminum shall conform to AWS D1.2, and welding of stainless steel shall conform to AWS D1.6.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver items to be incorporated into the work of other trades in sufficient time to be checked prior to installation.
- B. Repair items which have become damaged or corroded to the satisfaction of the Engineer prior to incorporating them into the work.

1.6 PROJECT/SITE REQUIREMENTS

- A. Field measurements shall be taken at the site, prior to fabrication of items, to verify or supplement indicated dimensions and to ensure proper fitting of all items.

PART 2 - PRODUCTS

2.1 GENERAL

- A. The use of manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired.

- B. Like items of materials shall be the end products of one manufacturer in order to provide standardization for appearance, maintenance and manufacturer's service.

2.2 MATERIALS

- A. Unless otherwise noted, materials for miscellaneous metals shall conform to the following standards:

1.	Structural Steel	ASTM A36	
2.	Structural Steel Tubing	ASTM A500, Grade B	
3.	Welded and Seamless Steel Pipe	ASTM A501 or ASTM A53, Type E or S, Grade B Schedule	40. Use standard malleable iron fittings, galvanized for exterior work
4.	Steel Sheets	ASTM A366	
5.	Gray Iron Castings	ASTM A48, Class 35	
6.	Ductile Iron Castings	ASTM A536, Grade 65-45-12	
7.	Aluminum Extruded Pipe	ASTM B429, Alloy 6063 T6	
8.	Aluminum Extruded Shapes	ASTM B221, Alloy 6061 T6	
9.	Aluminum Sheet and Plate	ASTM B209, Alloy 6061 T6	
10.	Stainless Steel Plates, Sheets, and Structural Shapes		
	a. Exterior, Submerged or Industrial Use	ASTM A167, Type 316 (Type 316L for welded)	
	b. Interior and Architectural Use	ASTM A167, Type 316	
11.	Stainless Steel Bolts, Nuts, and Washers	ASTM A276, Type 316	
12.	Carbon Steel Bolts and Studs	ASTM A307, Grade A (hot dip galvanized nuts and washers where noted)	
13.	High Strength Steel Bolts, Nuts and washers	ASTM A325 (mechanically galvanized per ASTM B695, Class 50, where noted)	
	a. Elevated Temperature Exposure	Type I	
	b. General Application	Type I or Type II	
14.	Galvanizing	ASTM A123, Zn w/0.5% minimum Ni	
15.	Galvanizing, hardware	ASTM A153, Zn w/0.5% minimum Ni	

2.3 MISCELLANEOUS ALUMINUM

- A. All miscellaneous metal work shall be formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength or durability. Holes shall be drilled or punched. Edges shall be smooth and without burrs. Fabricate supplementary pieces necessary to complete each item though such pieces are not definitely shown or specified.
- B. Connections and accessories shall be of sufficient strength to safely withstand the stresses and strains to which they will be subjected. Exposed joints shall be close fitting and jointed where least conspicuous. Threaded connections shall have the threads concealed where practical. Welded connections shall have continuous welds or intermittent welds as specified or shown. The face of welds shall be dressed flush and smooth. Welding shall be on the unexposed side as much as possible in order to prevent pitting or discoloration of the aluminum exposed surface. Grind smooth continuous welds that will be exposed. Provide holes for temporary field connections and for attachment of the work of other trades.
- C. Miscellaneous aluminum items shall include: beams, angles, closure angles, grates, hatches, floor plates, stop plates, stair nosings, and any other miscellaneous aluminum called for (Engineer coordinate with Designer) and not otherwise specified.
- D. Angle frames for hatches, beams, grates, etc, shall be complete with welded strap anchors attached.
- E. Aluminum diamond plate and floor plate shall have a minimum thickness of 3/8-in. Frames and supports shall be of aluminum construction. Fastening devices and hardware shall be Type 316 stainless steel. Plates shall have a mill finish.
- F. Stair treads for aluminum stairs shall have abrasive non-slip nosing as approved.
- G. Aluminum nosing at concrete stairs shall be Wooster Products, Inc.; Alumogrit Treads, Type 116; similar by Barry Pattern & Foundry Co.; Andco or equivalent. Furnish with wing type anchors and flat head stainless steel machine screws, 12-in on center. Nosing shall also be used at concrete ladder openings. Nosing shall a single piece for each step extending to within 3-in at each side of stair or full ladder width. Set nosing flush with stair tread finish at concrete stairs. Furnish treads with heavy duty protective tape cover.
- H. Miscellaneous aluminum items shall have a cleaned and degreased Class I anodized finish.

2.4 MISCELLANEOUS STEEL

- A. All miscellaneous metal work shall be formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength or durability. Holes shall be drilled or punched. Edges shall be smooth and without burrs. Fabricate supplementary pieces necessary to complete each item though such pieces are not definitely shown or specified.
- B. Connections and accessories shall be of sufficient strength to safely withstand the stresses and strains to which they will be subjected. Exposed joints shall be close fitting and jointed where least conspicuous. Threaded connections shall have the threads concealed where practical. Welded connections shall have continuous welds or intermittent welds as specified or shown. The face of welds shall be dressed flush and smooth. Grind smooth continuous welds that will be exposed. Provide holes for temporary field connections and for attachment of the work of other trades.
- C. Miscellaneous steel items shall include: beams, angles, lintels, metal stairs, support brackets, base

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plates for other than structural steel or equipment, closure angles, bridge crane rails, monorail hoist beams, hold down straps and lugs, door frames, splice plates, subframing at roof openings and any other miscellaneous steel called for and not otherwise specified.

- D. Structural steel angle and channel door frames shall be shop coated with primer. Frames shall be fabricated with not less than three anchors on each jamb.
- E. Steel pipe pieces for sleeves, lifting attachments and other functions shall be Schedule 40 pipe unless otherwise specified. Wall and floor sleeves, of steel pipe, shall have welded circumferential steel waterstops at mid-length.
- F. Lintels, relief angles or other steel supporting masonry or embedded in masonry shall be shop coated with primer.
- G. All steel finish work shall be thoroughly cleaned, by effective means, of all loose mill scale, rust and foreign matter and shall be given one shop coat of primer compatible with the finish coat after fabrication but before shipment. Paint shall be omitted within 3-in of proposed field welds. Paint shall be applied to dry surfaces and shall be thoroughly and evenly spread and well worked into joints and other open spaces.
- H. Galvanizing shall be the hot-dip zinc process after fabrication. Coating shall be not less than 2 oz/sq ft of surface.
- I. Interior Metal Stud Wall Framing;
Minimum 16 gauge metal studs for load bearing walls.
Minimum 20 gauge metal studs for non-load bearing walls.
Minimum 16 gauge metal studs for any exterior framed walls.
- J. All free standing walls must be braced at the top every 6 foot max. and every 4 foot min.
- K. Metal furring shall be fastened maximum of 24-inch O.C. vertically while maintaining 16-inch O.C. spacing.
- L. All framing will maintain 16-inch O.C. spacing.

2.5 MISCELLANEOUS STAINLESS STEEL (TYPE 316)

- A. All miscellaneous metal work shall be formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength or durability. Holes shall be drilled or punched. Edges shall be smooth and without burrs. Fabricate supplementary pieces necessary to complete each item though such pieces are not definitely shown or specified.
- B. Connections and accessories shall be of sufficient strength to safely withstand the stresses and strains to which they will be subjected. Exposed joints shall be close fitting and jointed where least conspicuous. Threaded connections shall have the threads concealed where practical. Welded connections shall have continuous welds or intermittent welds as specified or shown. The face of welds shall be dressed flush and smooth. Grind smooth continuous welds that will be exposed. Provide holes for temporary field connections and for attachment of the work of other trades.
- C. Miscellaneous stainless steel items shall include: beams, angles, bar racks and any other miscellaneous stainless steel called for and not otherwise specified.
- D. If so noted in the Drawings, miscellaneous stainless steel items shall receive two coats of an exterior coating of “moisture cured aluminized urethane” or epoxy paint as specified. Moisture

cured (aluminum and primers, grey or silver color), Sherwin Williams or “Wasser MC-Aluminum” or approved equal. Surface preparation shall be in accordance with paint manufacturer’s recommendation and Section 09900 Protective Coatings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install all items except those to be embedded in concrete which shall be installed per the requirements of the Structural Drawings. Items to be attached to concrete or masonry after such work is completed shall be installed in accordance with the details shown. Fastening to wood plugs in masonry will not be permitted.
- B. Abrasions in the shop primer shall be touched up immediately after erection. Areas left unprimed for welding shall be painted with primer after welding.
- C. Zinc coating which has been burned by welding, abraded, or otherwise damaged shall be cleaned and repaired after installation. The damaged area shall be thoroughly cleaned by wire brushing and all traces of welding flux and loose or cracked zinc coating removed prior to painting. The cleaned area shall be painted with two coats of zinc oxide-zinc dust paint conforming to the requirements of Military Specifications MIL-P-15145. The paint shall be properly compounded with a suitable vehicle in the ratio of one part zinc oxide to four parts zinc dust by weight.
- D. Specialty products shall be installed in accordance with the manufacturer's recommendations.
- E. Expansion bolts shall be checked for tightness a minimum of 24 hours after initial installation.
- F. Install adhesive capsule anchors using manufacture's recommended drive units and adapters and in compliance with the manufacturer's recommendations.
- G. Headed anchor studs shall be welded in accordance with manufacturer's recommendations.
- H. All railings shall be erected to line and plumb.
- I. All steel surfaces that come into contact with exposed concrete or masonry shall receive a protective coating of an approved heavy bitumastic troweling mastic applied in accordance with the manufacturer's instructions prior to installation.
- J. Where aluminum contacts a dissimilar metal, apply a heavy brush coat of zinc-chromate primer followed by two coats of aluminum metal and masonry paint to the dissimilar metal.
- K. Where aluminum contacts masonry or concrete, apply a heavy coat of approved alkali resistant paint to the masonry or concrete.
- L. Where aluminum contacts wood, apply two coats of aluminum metal and masonry paint to the wood.
- M. Between aluminum grating, aluminum stair treads, or aluminum handrail brackets and steel supports, insert 1/4-in thick neoprene isolator pads, 85 plus or minus 5 Shore A durometer, sized for full width and length of bracket or support.
- N. Stainless Steel:
 - 1. During handling and installation, take necessary precautions to prevent carbon impregnation of stainless steel members.

2. After installation, visually inspect stainless steel surfaces for evidence for iron rust, oil, paint, and other forms of contamination.
3. Remove contamination using cleaning and passivation methods in accordance with requirements of ASTM A380 and ASTM A967.
4. Brushes used to remove foreign substances shall utilize only stainless steel or nonmetallic bristles.
5. After treatment, visually inspect surfaces for compliance.

END OF SECTION

**SECTION 09900
PROTECTIVE COATINGS**

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. This specification defines the methods of surface preparation, coating systems, and methods of application for painting as outlined herein.
- B. The work includes painting/coating and finishing of interior and exterior exposed items above and below grade surfaces, such as structural steel, interior and exterior block walls miscellaneous metals, ceilings, walls, floors, doors, frames, pipe, fittings, valves, pumps, tanks, equipment, and all other work obviously required to be painted/coated unless otherwise specified herein. The omission of minor items in the schedule of work shall not relieve the contractor of his obligation to include such items where they come within the general intent of the specification as stated herein.
- C. The Contractor shall furnish all supervision, labor, tools, materials, equipment, scaffolding or other structures, and supervision required for the transportation, unloading, storage, and application of the paint/coating and associated products covered by this specification.
- D. The Contractor or subcontractor shall be certified and licensed for painting/coating and shall have a minimum of five (5) years of experience of similar projects in the State of South Carolina.
- E. The Contractor shall perform surface preparation and application of the painting/coating strictly as specified herein or recommended by the Painting/Coating Manufacturer or the Manufacturer's Representative for each item as specified herein or elsewhere.
- F. The following items will not be painted/coated:
 - 1. Any code requiring labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name or nomenclature plates.
 - 2. Any moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sensing devices, motor and fan shafts, unless otherwise indicated.
 - 3. Aluminum handrails, walkways, windows, louvers, and grating unless otherwise specified herein or elsewhere.
 - 4. Stainless steel work.
 - 5. Signs and nameplates.
 - 6. Finish hardware.
 - 7. Products with polished chrome or nickel finish.
 - 8. Plastic switch plates and receptacle plates.
 - 9. Flexible couplings, lubricated bearing surfaces, insulation and metal and plastic pipe interior.
 - 10. Sprinkler heads.
- G. All work shall be done in strict accordance with this specification, Contract Documents, and the painting package, including manufacturer's printed instructions.
- H. The Contractor will obtain, at its own expense, all permits, licenses and inspections and shall comply with all laws, codes, ordinances, rules, and regulations promulgated by authorities having jurisdiction, which may bear on the work. This compliance will include Federal Public Law 91-596 more commonly known as the "Occupational Safety and Health Act of 1970."

- I Surfaces to be painted: (Refer to Section 3.11 Coating Systems Schedule for description of surfaces to be painted/coated, preparation, and their specified coating systems and colors).

1.2 DEFINITIONS

- A Field Painting: is the painting of new or rebuilt items at the job site. Field painting shall be the responsibility of the Contractor.
- B Shop Painting: is the painting of new or rebuilt items in the shop prior to delivery to the jobsite.
- C Abbreviations and Terms:
 - 1. SSPC - Society for Protective Coatings
 - 2. ASTM - American Society of Testing Materials
 - 3. NACE - National Association of Corrosion Engineers
 - 4. NSF - National Sanitation Foundation (Standard 61)
 - 5. AWWA - American Water Works Associates (AWWA D102-97)
 - 6. ICRI - International Concrete Repair Institute
 - 7. CSP - Concrete Surface Profile (1-9)
 - 8. Exterior - outside, exposed to weather
 - 9. Interior Dry - inside, not subject to immersion service
 - 10. Interior Wet - inside, subject to immersion service

1.3 RESOLUTION OF CONFLICTS

- A It shall be the responsibility of the General Contractor to arrange a meeting prior to the start of painting/coating between the Contractors, the Painting/Coating Manufacturer, whose products are to be used, Owner, and Owner's Representative. All aspects of surface preparation, application and coating systems as specified herein will be reviewed at this meeting.
- B Clarification shall be requested promptly from the Owner's Representative when instructions are lacking, conflicts occur in the specification, or the procedure seems improper or inappropriate for any reason.
- C It shall be the responsibility of the Painting/Coating Manufacturer to have their factory representative meet in person with the Contractor and Owner's Representative a minimum of three (3) times during the job as a consultant on surface preparation, mil thickness of coating and proper application of coating unless meeting is determined to be unnecessary by the Owner's Representative.

1.4 INSPECTION OF SURFACES

- A Before application of the prime coat and each succeeding coat, all surfaces to be coated shall be subject to inspection by the Owner's Representative or the coating manufacturer. Any defects or deficiencies shall be corrected by the Contractor before application of any subsequent coating.
- B Samples of surface preparation and of painting systems shall be furnished by the Contractor to be used as a standard throughout the job, unless omitted by the Owner's Representative.
- C When any appreciable time has elapsed between coatings, previously coated areas shall be carefully inspected by the Painting/Coating Manufacturer or their factory representative, and where, in his opinion, surfaces are damaged or contaminated, they shall be cleaned and recoated at the Contractor's expense. Recoating times of manufacturer's printed instructions shall be followed.
- D Coating thickness shall be determined by the use of a properly calibrated "Nordson-Mikrotest" "Positest" Coating Thickness Gauge (or equal) for ferrous metal or an OG232 "Tooke" Paint Inspection gauge (or equal) for non-ferrous and cementitious surfaces. Please note that use of the "Tooke" gauge is classified as a destructive test and repairs due to testing shall be performed by

the Contractor. Thickness testing shall be performed in the presence of the owner's representative.

- E. Prior to coating and if more than two days has elapsed between coats, the surface shall be testing for chloride contamination. See section 3.09 for testing requirements.

1.5 EQUIPMENT

- A. Effective oil and water separators shall be used in all compressed air lines serving spray painting and sandblasting operations to remove oil or moisture from the air before it is used. Separators shall be placed as far as practical from the compressor.
- B. All equipment for application of the paint and the completion of the work shall be furnished by the Contractor in first-class condition and shall comply with recommendations of the painting/coating manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Tnemec Company, Inc. - 6800 Corporate Drive, Kansas City, MO 64120
- B. Carboline Company - 2150 Schuetz Road, St. Louis, MO 63146
- C. Corrocoat - 6525 Greenland Road, Jacksonville, FL 32258

2.2 MATERIALS

- A. All materials specified herein shall be manufactured by one of the suppliers listed in section 2.1. These products are specified to establish standards of quality and are approved for use on this project. No alternatives will be acceptable.
- B. All new piping, appurtenances and equipment shall be purchased shop lined and/or coated with touch up kits provided for damage caused during installation.
- C. All coatings to be shop applied must meet the requirements for volatile organic compounds (VOC) of not more than 2.91 lbs/gallon (350 gms/Liter) after thinning.
- D. Colors, where not specified, shall match as close as possible to the existing color of the existing facilities or as selected by the Owner or Owner's Representative.
- E. All coatings in contact with potable water need to be NSF Tested and Certified in accordance with ANSI/NSF Standard 61.
- F. Paint used in successive field coats shall be produced by the same manufacturer. Paint used in the first field coat over shop painted or previously painted surfaces shall cause no wrinkling, lifting, or other damage to underlying paint. Shop paint shall be of the same type and manufacturer as used for field painting by the Contractor.
- G. Emulsion and alkyd paints shall contain a mildewcide and both the paint and mildewcide shall conform to OSHA and Federal requirements, including Federal specification TT-P-19.
- H. Finish coats containing lead shall not be allowed. Oil shall be pure boiled linseed oil.
- I. Rags shall be clean painter's rags, completely sterilized.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

The surface shall be cleaned as specified for the paint system being used. All cleaning shall be as outlined in the Steel Structures Painting Council's Surface Preparation Specification, unless otherwise noted. If surfaces are subject to contamination, other than mill scale or normal atmospheric rusting, the surfaces shall

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be pressure washed, and acid or caustic pH residues neutralized, in addition to the specified surface preparation. Surfaces close to the coast shall be checked for chloride contamination.

- A. All surface preparation done on site shall use surface preparation in accordance SSPC-SP1, SP2 and/or SP3 as to avoid blasting on-site. Surface preparation of concrete wetwells and manholes for installation of Spectrashield liner system shall utilize SSPC-SP13 or as recommended by liner system manufacturer.
- B. Standards for Surface Preparation:
- SSPC-SP1 Chemical and/or Solvent Cleaning
Remove all grease, oil, salt, acid, alkali, dirt, dust, wax, fat, foreign matter, and contaminants, etc. by one of the following methods: steam cleaning, alkaline cleaning, or volatile solvent cleaning.
 - SSPC-SP2 Hand Tool Cleaning
Removal of loose rust, loose mill scale, and loose paint to a clean sound substrate by hand chipping, scraping, sanding, and wire brushing.
 - SSPC-SP3 Power Tool Cleaning
Removal of loose rust, loose mill scale, and loose paint to a clean sound substrate by power tool chipping, descaling, sanding, wire brushing, and grinding.
 - SSPC-SP4 Flame Cleaning
Dehydrating and removal of rust, loose mill scale, and some light mill scale by use of flame, followed by wire brushing.
 - SSPC-SP5 (NACE-1) White Metal Blast Cleaning
Complete removal of all mill scale, rust, rust scale, previous coating, etc., leaving the surface a uniform gray-white color.
 - SSPC-SP6 (NACE-3) Commercial Grade Blast Cleaning
Complete removal of all dirt, rust scale, mill scale, foreign matter, and previous coatings, etc., leaving only shadows and/or streaks caused by rust stain and mill scale oxides. At least 66% of each square inch of surface area is to be free of all visible residues, except slight discoloration.
 - SSPC-SP7 (NACE-4) Brush-Off Blast Cleaning
Removal of rust scale, loose mill scale, loose rust, and loose coatings, leaving tightly bonded mill scale, rust and previous coatings. On concrete surfaces, brush-off blast cleaning shall remove all laitance, form oils, and solid contaminants. Blasting should be performed sufficiently close to the surface so as to open up surface voids, bug holes, air pockets, and other subsurface irregularities, but so as not to expose underlying aggregate.
 - SSPC-SP8 Pickling
Complete removal of rust and mill scale by acid pickling, duplex pickling or electrolytic pickling (may reduce the resistance of the surface to corrosion, if not to be primed immediately).
 - SSPC-SP10 (NACE-2) Near-White Blast Cleaning
Removal of all rust scale, mill scale, previous coating, etc., leaving only light stains from rust, mill scale, and small specks of previous coating. At least 95% of each square inch of surface area is to be free of all visible residues and the remainder shall be limited to slight discoloration.
 - SSPC-SP11 Power Tool Cleaning to Bare Metal
Complete removal of rust, rust scale, mill scale, foreign matter, and previous coatings, etc., to a standard as specified on a Commercial Grade Blast Cleaning (SSPC-SP6, NACE-3) by means of power tools that will provide the proper degree of cleaning and surface profile.
 - SSPC-SP12 (NACE-2) Surface Preparation by Water Jetting
Surface preparation of steel and other substrates by ultra-high pressure water jetting.
 - SSPC-SP13 (NACE-6) Surface Preparation of Concrete
Surface preparation of concrete by mechanical, chemical, or thermal methods prior to the application of bonded protective coating or lining systems.
 - SSPC-SP14 (NACE-8) Industrial Blast Cleaning
Surface preparation standards for industrial blast cleaning allowing for traces of tightly

adherent mill scale, rust, & coating residues on 10% of the surface.

- SSPC-SP15 Commercial Grade Power Tool Cleaning
Commercial grade power tool cleaning a steel surface to produce a 1.0-mil surface profile. This method of cleaning falls between SP3 & SP11.
- SSPC-SP 16 Brush-Off Blast Cleaning of Non-Ferrous Metals
Brush-off blast cleaning of coated or uncoated metal surfaces other than carbon steel prior to the application of a protective coating system. Roughen and clean coated and uncoated non-ferrous metal substrates, including, but not limited to, galvanized surfaces, stainless steel, copper, aluminum, and brass.

- C. Ductile Iron Surface Preparation shall conform to NAPF Section 500 “Coatings and Linings”.
- D. Visual standards – SSPC-VIS-1(Swedish SIS OS 5900), “Pictorial Surface Preparation Standards for Painting Steel Surfaces,” and the National Association of Corrosion Engineers, “Blasting Cleaning Visual Standards” TM-01-70 and TM-01-75 shall be considered as standards for proper surface preparation.
- E. Visual standards from International Concrete Repair Institute CSP1-9 for degree of roughness and surface profile of concrete.
- F. Oil, grease, soil, dust, etc., deposited on the surface preparation that has been completed shall be removed prior to painting according to SSPC-SP1 Solvent Cleaning.
- G. Weld flux, weld spatter and excessive rust scale shall be removed by Power Tool Cleaning as per SSPC-SP11-87T.
- H. All weld seams, sharp protrusions, and edges shall be ground smooth prior to surface preparation or application of any coatings.
- I. All areas requiring field welding shall be masked off prior to shop coating, unless waived by the Owner's Representative.
- J. All areas which require field touch-up after erection, such as welds, burnbacks, and mechanically damaged areas, shall be cleaned by thorough Power Tool as specified in SSPC-SP11-87T.
- K. “Touch-up systems will be same as original specification except that approved manufacturer’s organic zinc-rich shall be used in lieu of inorganic zinc where this system was originally used. Also, strict adherence to manufacturer’s complete touch-up recommendations shall be followed. Any questions relative to compatibility of products shall be brought to the Owner's Representative’s attention; otherwise, Contractor assumes full responsibility.

3.2 PRETREATMENTS

- A. When specified, the surface shall be pretreated in accordance with the specified pretreatment prior to application of the prime coat of paint.

3.3 STORAGE

- A. Materials shall be delivered to the job site in the original packages with seals unbroken and with legible unmutated labels attached. Packages shall not be opened until they are inspected by the Owner's Representative and required for use. All painting materials shall be stored in a clean, dry, well-ventilated place, protected from sparks, flame, and direct rays of the sun or from excessive heat. Paint susceptible to damage from low temperatures shall be kept in a heated storage space when necessary. The Contractor shall be solely responsible for the protection of the materials stored by him at the job site. Empty coating cans shall be required to be neatly stacked in areas designated by the Owner or Owner's Representative and removed from the job site on a schedule determined by the Owner or Owner's Representative. Owner and/or Owner's Representative may request a notarized statement from the Contractor detailing all materials used on the project.

3.4 PREPARATION OF MATERIALS

- A. Mechanical mixers, capable of thoroughly mixing the pigment and vehicle together, shall mix the paint/coating prior to use where required by manufacturer's instructions; thorough hand mixing will be allowed for small amounts up to one (1) gallon. Pressure pots shall be equipped with mechanical mixers to keep the pigment in suspension, when required by manufacturer's instructions. Otherwise, intermittent hand mixing shall be done to assure that no separation occurs. All mixing shall be done in accordance with SSPC Vol. 1, Chapter 4, "Practical Aspects, Use and Application of Paints" and/or with manufacturer's recommendations.
- B. Catalysts or thinners shall be as recommended by the manufacturer and shall be added or discarded strictly in accordance with the manufacturer's instruction.
- C. Condition materials to 70°F -80°F for a minimum of 24 hours prior to use.

3.5 APPLICATION

- A. Paint shall be applied only on thoroughly dry surfaces and during periods of favorable weather, unless otherwise allowed by the paint/coating manufacturer. Except as provided below, painting shall not be permitted when the atmospheric temperature is below 50° F, or when freshly painted surfaces may be damaged by rain, fog, dust, or condensation, and/or when it can be anticipated that these conditions will prevail during the drying period. Note some materials may have a lower minimum atmospheric temperature and manufacturer's recommendation shall be followed.
- B. Dew Point: temperature at which moisture will condense on surface. No coatings should be applied unless surface temperature is a minimum of 5° above this point. Temperature must be maintained during curing.
 - Example: If air temperature is 70°F and relative humidity is 65%, the dew point is 57°F. No coating should be applied unless surface temperature is 62°F minimum.
- C. No coatings shall be applied unless the relative humidity is below 85%.
- D. Suitable enclosures to permit painting during inclement weather may be used if provisions are made to control atmospheric conditions artificially inside the enclosure, within limits suitable for painting throughout the painting operations.
- E. Field Painting in the immediate vicinity of, or on, energized electrical and rotating equipment, and equipment and/or pipes in service shall not be performed without the approval of the Owner's Representative.
- F. Extreme care shall be exercised in the painting of all operable equipment, such as valves, electric motors, etc., so that the proper functioning of the equipment will not be affected.
- G. The Contractor's scaffolding shall be erected, maintained, and dismantled without damage to structures, machinery, equipment or pipe. Drop cloths shall be used where required to protect buildings and equipment. All surfaces required to be clear for visual observations shall be cleaned immediately after paint application.
- H. Painting shall not be performed on insulated pipe within three (3) feet of insulation operations or on insulation whose covering and surface coat have not had time to set and dry. Painting shall not be performed on uninsulated pipe within one (1) foot of any type of connection until the connection has been made, except as directed by the Owner's Representative.
- I. The prime coat shall be applied immediately following surface preparation and in no case later than the same working day. All paint shall be applied by brushing, paint mitt and roller, conventional spraying, or airless spraying, using equipment approved by the paint/coating manufacturer.
- J. Each coat of paint shall be recoated as per manufacturer's instructions. Paint/coating shall be considered re-coatable when an additional coat can be applied without any detrimental film

irregularities such as lifting or loss of adhesion. Follow the manufactures printed recoat times.

- K. Surfaces that will be inaccessible after assembly shall receive either the full specified paint system or three shop coats of the specified primer before assembly.
- L. Finish colors shall be in accordance with the Owner's Direction or match existing colors and shall be factory mixed (i.e., there shall be no tinting by the Contractor).
- M. All edges and weld seams in immersion service shall receive a "stripe coat" (applied by brush) after the 1st coat.
- N. All hairline cracks or patches shall receive "stripe coat" of the 1st coat prior to application of the full 1st coat.
- O. All open seams in the roof area of tanks shall be filled after application of the topcoat with a flexible caulking such as Sika Flex 1A.

3.6 WORKMANSHIP

- A. The Contractor must show proof that all employees associated with this project shall have been employed by the Contractor for a period not less than six (6) months.
- B. Painting/coating shall be performed by experienced painters/coaters in accordance with the recommendations of the paint/coating manufacturer. All paint/coating shall be uniformly applied without sags, runs, spots, or other blemishes. Work, which shows carelessness, lack of skill, or is defective in the opinion of the Owner or Owner's Representative, shall be corrected at the expense of the Contractor.
- C. The Contractor or subcontractor shall be certified and licensed for painting/coating and shall have a minimum of five (5) years of experience of similar projects in the State of South Carolina. Contractor shall be certified as SSPC QP1SM.
- D. The Contractor or subcontractor installing or repairing liner system shall be certified and approved by the product manufacturer .
- E. The Contractor shall guarantee the workmanship of the Work performed and materials will be free from defects or failure of workmanship for a period of one (1) year upon completion of the Work.
- F. Liner system manufacturer shall provide a 10 year warranty for installations where the liner system is removed and replaced in its entirety.

3.7 APPLICATION OF PAINT

- A. By Brush and/or Rollers:
 - 1. Top quality, properly styled brushes and rollers shall be used. Rollers with a baked phenol core shall be utilized.
 - 2. The brushing or rolling shall be done so that a smooth coat as nearly uniform in thickness as possible is obtained. Brush or roller strokes shall be made to smooth the film without leaving deep or detrimental marks.
 - 3. Surfaces not accessible to brushes or rollers may be painted by spray, by dauber or sheepskins, and paint mitt.
 - 4. It may require two (2) coats to achieve the specified dry film thickness if application is by brush and roller.
- B. Air, Airless, or Hot Spray:
 - 1. The equipment used shall be suitable for the intended purpose, shall be capable of properly atomizing the paint to be applied and shall be equipped with suitable pressure regulators and gauges.
 - 2. Paint shall be applied in a uniform layer, with a 50% overlap pattern. All runs and sags

should be brushed out immediately or the paint shall be removed and the surface resprayed.

3. High build coatings should be applied by a crosshatch method of spray application to ensure proper film thickness of the coating.
4. Areas inaccessible to spray shall be brushed; if also inaccessible to brush, daubs or sheepskins shall be used, as authorized by the manufacturer.
5. Special care shall be taken with thinners and paint temperatures so that paint of the correct formula reaches the receiving surface.
6. Nozzles, tips, etc., shall be of sizes and designs as recommended by the manufacturer of the paint being sprayed.
7. The first coat on concrete surfaces in immersion service should be thinned, then sprayed and backrolled or roller applied.

3.8 PROTECTION AND CLEAN-UP

- A. It shall be the responsibility of the Contractor to protect at all times, in areas where painting is being done, floors, materials of other crafts, equipment, vehicles, fixtures, and finished surfaces adjacent to paint/coating work. Cover all electric plates, surface hardware, nameplates, gauge glasses, etc., before start of painting/coating work.
- B. At the option of the Owner's Representative during the course of this project, the Contractor will contain all spent abrasives, old paint chips, paint overspray and debris by means suitable to the Owner's Representative, including but not limited to, full shrouding of the area.
- C. If shrouding is required, the Contractor must provide a complete design of the intended shroud or cover. Care must be taken not to modify or damage the structure during the use of the shroud. If damage should occur, the Contractor is held responsible for all repairs.
- D. At completion of the work, remove all paint/coating where spilled, splashed, splattered, sprayed or smeared on all surfaces, including glass, light fixtures, hardware, equipment, painted, and unpainted surfaces.
- E. After completion of all painting, the Contractor shall remove from job site all painting/coating equipment, surplus materials, and debris resulting from the Work.
- F. The Contractor is responsible for the removal and proper disposal of all hazardous materials from the jobsite in accordance with Local, State, and Federal requirements as outlined by the United States Environmental Protection Agency(USEPA).
- G. A notarized statement shall be presented to the Owner and Owner's Representative that all hazardous materials have been disposed of properly including but not limited to: name of disposal company, disposal site, listing of hazardous materials, weights of all materials, cost per pound and USEPA registration number.

3.9 TESTING

- A. Prior to coating application, using Chlor*test or equal, contractor should verify that the chloride content is ≤ 25 ppm and that the surface pH is between 4 and 9. If the chloride level is higher than allowable limits and / or the pH is outside of the allowable limits, contractor should use Chor*rid or equal to wash until clean. Additional sweep blast of substrate will be required if wash is necessary.
- B. The Contractor shall conduct for the prime and intermediate coats a steel holiday test in accordance to ASTM G62. Test results shall be certified by an independent coating inspector certified by NACE.
- C. The Contractor shall conduct for the finish coat a spark test in accordance to ASTM D5162. Test results shall be certified by an independent coating inspector certified by NACE.

3.10 ON-SITE INSPECTION

- A. During the course of this project the Owner and/or Owner's Representative will reserve the option of incorporating the services of a qualified inspection service. The inspection service will be responsible for assuring the proper execution of this specification by the successful Contractor.

3.11 COATING SYSTEM SCHEDULE

- A. Painting/coating all items specified here in shall be in accordance with the manufacturer's recommendations for surface preparation, painting/coating system and application methods. If the painting/coating surface preparation, painting/coating system, dry film thicknesses, and application methods specified herein are in conflict the manufacturer's recommendations, the manufacturer's recommendations shall supersede what is specified herein:

1. Non Ferrous and Steel – Structural Fabrications

Surface Preparation: For on-site surface preparation use SSPC-SP1 and SSPC-SP3 as to avoid blasting on-site. For shop applied coating, abrasive blast non-immersion surfaces to a minimum Commercial Grade Finish in accordance with SSPC SP 6 with a minimum 2.0 mil blast profile. For immersion service finish in accordance with SSPC 10. Near white abrasive blast with a minimum 2.0 mils per blast profile. All steel shall be coated the same day as blasted and before any rust bloom forms.						
	CARBOLINE		CORROCOAT		TNEMEC	
Coats		DFT mils		DFT mils		DFT mils
1st	Plasite 4500S	30 - 40	Plasmet ZF	10	Series 1 Omnithane ¹	2.5 – 3.5
2nd	NA		Plasmet ZF	10	Series 104HS	6 – 8
3rd	NA		Corrothane API	2	Non-Immersion Service: Series 740 UVX	3 - 5
					Immersion Service: H.S. Epoxy Series 104	6 – 10

Notes: New structural fabrications to be shop primed when applicable.

2. Blockwall – Inside and Outside the building

Surface Preparation: For previously painted block, pressure wash at 5,000 psi with a cleaner and remove all old coating from corner blocks. For exterior new block, pressure wash at 3,500 psi.						
	CARBOLINE		CORROCOAT		TNEMEC	
Coats		DFT mils		DFT-mils	Color: Warm Sun 01BR	DFT-mils
1st	Carbocrylic 3357 HB	5 - 8	Polyglass WCP	4 - 6	Previously Painted Block: Tnemec Series 1026 Enduratone.	2 - 3
					New Block: Tnemec Series 1254 Epoxyblock	100 sq.ft per Gallon
2nd	Carbocrylic 3357 HB	5 - 8	NA		Previously Painted Block: Tnemec Series 1026 Enduratone	2 - 3
					New Block: Tnemec Series 1026 Enduratone	2 - 3
3rd	NA		NA		New Block: Tnemec Series 1026 Enduratone	2- 3

3. Metal – Inside and Outside the building

Surface Preparation: Metals prep with a minimum 5,000 psi pressure wash. Contractor to check for chloride contamination prior to coating.						
	CARBOLINE		CORROCOAT		TNEMEC	
Coats		DFT-mils		DFT-mils		DFT-mils
1st	Rustbond	1 – 2	Plasmet ZF	6	Spot prime Tnemec Series 135 Chembuild	4 - 6
2nd	Carbomastic 615 Grey	5 – 10	Plasmet ZF	6	Full coat of Tnemec Series 135 Chembuild	4 - 6
3rd	Carboxane 2000	3 – 7	Corrothane AP1	2 - 4	Tnemec Series 740 UVX	3– 5

Notes: 2nd coat required for outside and immersion service.

4. Generator (unless otherwise noted on Electrical Drawings and Specifications)

Surface Preparation: Preferred is Sweep blasting per SSPC SP7 to obtain a minimum 1.5 mils profile. Spot blast any bare and rusted areas to an SSPC SP6 and feather to a tightly, well adhered coating. Acceptable is a high pressure water cleaning per SSPC WJ4. Power Tool clean any rusted or bare areas per SSPC SP3 and feather to well adhered coating.						
	CARBOLINE		CORROCOAT		TNEMEC	
Coats		DFT-mils		DFT-mils		DFT-mils
1st	Carbomastic 615 Aluminum	5 – 10	Plasmet ZF	6	Spot prime Tnemec Series 135 Chembuild	5 - 7
2nd	Carbomastic 615 Tan	5 – 10	Plasmet ZF	6	Full coat of Tnemec Series 135 Chembuild	4 - 6
3rd	Carboxane 2000	3 – 7	Corrothane AP1	2 - 4	Tnemec Series 740 UVX	3 – 5

Notes: This equipment is assumed to be factory coated per manufacturer’s standard process. Where factory coating is not applied, these paint options shall apply. Factory coatings shall include a touch up kit for any minor damage caused during installation.

5. Generator Base (Unless otherwise noted on Electrical Drawings and Specifications)

Surface Preparation: Preferred is Sweep blasting per SSPC SP7 to obtain a minimum 1.5 mils profile. Spot blast any bare and rusted areas to an SSPC SP6 and feather to tightly, well adhered coating. Acceptable is a high pressure water cleaning per SSPC WJ4. Power Tool clean any rusted or bare areas per SSPC SP3 and feather to well adhered coating.						
	CARBOLINE		CORROCOAT		TNEMEC	
Coats		DFT-mils		DFT-mils		DFT-mils
1st	Carbomastic 615 Aluminum	5 – 10	Plasmet ZF	6	Spot prime Tnemec Series 135 Chembuild	5 - 7
2nd	Carbomastic 615 Tan	5 – 10	Plasmet ZF	6	Full coat of Tnemec Series 135 Chembuild	4 - 6
3rd	Carboxane 2000	3 – 7	Corrothane AP1	2 - 4	Tnemec Series 740 UVX	3 – 5

Notes: This equipment is assumed to factory coated per manufacturer’s standard process. Where factory coating is not applied, these paint options shall apply. Factory coatings shall include a touch up kit for any minor damage caused during installation.

6. Outside piping, fitting, valves and pumps

Surface Preparation: NAPF-Standard for ductile iron pipe. Surface preparation on site shall use NAPF 500-03-01, 500-03-02 and/or 500-03-03 as to avoid blasting on-site. If painting powder coated fittings is required, abrade the surface per 500-03-03. Shop blasting shall be performed according to NAPF 500-03-04 and 500-03-05.						
	CARBOLINE		CORROCOAT		TNEMEC	
Coats		DFT-mils		DFT-mils		DFT-mils
1st	Carbomastic 615 Aluminum	5.0 – 10.0	Plasmet ZF	6.0	Tnemec Series 90-97 Tneme-Zinc	2.5 – 3.5
2nd	Carbomastic 615 Tan	5.0 – 10.0	Plasmet ZF	6.0	Full coat of Tnemec Series 135 Chembuild	4.0 - 6.0
3rd	Carboxane 2000	3.0 – 7.0	Corrothane AP1	2.0 - 4.0	<u>Above Ground Exposed:</u> Tnemec Series 740 UVX (Above Ground Exposed)	3.0 – 5.0
					<u>Buried Pipe:</u> Tnemec Series 142 Epoxoline	13 - 16

Note: New materials and equipment is to be coated at factory with touch up kits provided for damage caused during installation.

7. Inside/Immersed Piping, Fittings, Valves and Plumbing

Surface Preparation: NAPF-Standard for ductile iron pipe. Surface preparation on site shall use NAPF 500-03-01, 500-03-02 and/or 500-03-03 as to avoid basting on-site. Shop basting shall be performed according to NAPF 500-03-04 and 500-03-05.						
	CARBOLINE		CORROCOAT		TNEMEC	
Coats		DFT-mils		DFT-mils		DFT-mils
1st	Plasite 4500 S	20 - 60	Polyglass VE	30	Series 22 Epoxoline	30
2nd	NA		Polyglass VE	30	NA	
3rd	NA		Armagel	30	NA	

Notes: New materials and equipment is to be coating is factory with touch up kits provided for damage caused during installation.

8. Concrete Wet Wells and Manholes

Surface Preparation: Surface preparation of concrete wetwells and manholes for installation of liner system shall utilize SSPC-SP13 or as recommended by liner system,. All deteriorated concrete, hard contaminants, localized micro-organisms and gas contaminants shall be removed from interior concrete surfaces. Final surface shall be a cleaned, exposed and virgin concrete aggregate ready for rehabilitation material. Containment unit to capture spent abrasive materials shall be provided unless otherwise approved by Engineer or Owner. After completion of the surface preparation, perform the seven point checklist including inspection for: leaks, cracks, holes, exposed rebar, ring and cover/hatch condition, invert condition, and inlet and outlet pipe condition. Repair all leaks and cracks with materials recommended by liner manufacturer.; repairs to exposed rebar, defective pipe penetrations or inverts, etc. shall be repaired utilizing non-shrink grout or approved alternate method.						
Liner System (Reference Sections 02640 Sewer System Construction and Section 02960 Sanitary Sewer Manhole Rehabilitation)						

END OF SECTION

**SECTION 11305
SUBMERSIBLE SEWAGE PUMPS**

PART I – GENERAL

1.1 DESCRIPTION

A. Scope of Work:

1. The work included under this Section consists of furnishing and installing submersible pumps, motors, and related equipment for the project pump stations fully tested, complete and in operating condition.
2. Related Work Described Elsewhere:

Electrical and Instrumentation: Division 16.

1.2 QUALITY ASSURANCE

- A. Unit Responsibility: The pumps, motors, control panel, frames and covers, guide rail system, float switches, and wet well terminal box(es) shall be supplied by the pump supplier to insure unit responsibility.
- B. Factory Tests: The pump manufacturer shall perform the following tests on each pump before shipment from the factory:
1. Megger the pump for insulation breaks or moisture.
 2. Prior to submergence, the pump shall be run dry and be checked for correct rotation.
 3. Pump shall be run for 30 minutes in a submerged condition.
 4. Pump shall be removed from test tank, meggered immediately for moisture; oil plug removed for checking lower seal; inspection plug removed for checking of upper seal and possible water intrusion of stator housing.
 5. A written certified test report giving the above information shall be supplied with each pump at the time of shipment.
 6. All end of pump cables will then be fitted with a rubber shrink fit boot to protect cable prior to electrical installation.
- C. Guaranteed Parts Stock Program: The pump supplier shall have a Guaranteed Parts Stock Program in the State of South Carolina. In lieu of a Guaranteed Parts Stock Program, the pump supplier shall provide one set of spare parts for each type of pump supplied. These parts shall include at least one (1) set of spare parts as detailed below for each different model of pump supplied on this Contract.
1. Upper Mechanical Seal.
 2. Lower Mechanical Seal.
 3. Wear Rings.
 4. Motor Cable.

5. Cable Entry Washer/Grommet.
 6. Complete Set of "O" Rings.
 7. Inspection Plug Washers.
 8. Impeller Bolt.
 9. Impeller Key.
 10. Upper Bearing.
 11. Lower Bearing.
- D. Standards:
1. ANSI.
 2. ASTM.
 3. NEC.
 4. NEMA.

1.3 SUBMITTALS (See Section 01340: Shop Drawings, Working Drawings and samples)

- A. Materials and Shop Drawings:
1. The Contractor shall conform shop drawings to Section 01340: Shop Drawings, Working Drawings, and Samples and as required below.
 2. The Contractor shall submit the following to the Engineer for approval in accordance with Section 01340: Shop Drawings, Working Drawings, and Samples.
 - a. Manufacturer's literature, illustrations and applicable data for the individual pumps, including the total weight of the equipment and the weight of the single largest item.
 - b. Manufacturer's certified curves illustrating pump characteristics of head, discharge, brake horsepower and efficiency. Curves shall be submitted on 8-1/2 inch by 11-inch sheets, at as large a scale as is practical. Curves shall be plotted from no flow at shut-off head to maximum pump runout head and gallonage allowed by the manufacturer. Points of operation which cause bearing stress or shaft deflection in excess of the manufacturer's tolerances for continuous operation shall be indicated on the submitted curves.
 - c. The shop drawings shall include details of pump assembly, installation layouts, procedures, types of materials used in pump construction, details on all pump accessories, and dimensions of major components. Where applicable, where pumps are provided as a part of a complete package inclusive of controls, control diagrams shall be provided.
 - d. A complete total bill of materials for all equipment.
 - e. A list of manufacturer's recommended spare parts to be supplied, with the manufacturer's current price for each item. Include O-rings, seals, etc., on the list. List bearings by the bearing manufacturer's name and numbers only.

- f. Pumping equipment requiring special tools for maintenance shall be provided with one set of tools labeled, packed with instructions for use, and housed in a metal tool box with lock-end hoop for each two units provided.
- g. The following data shall be provided on the drive motors: rpm at full load, frequency, voltage, full load current, code and design letter, efficiency, horsepower, number of phases, time rating, temperature rise, service factor and bearing life rating. The submittal shall include motor manufacturer's recommended lubrication requirements.

1.4 WARRANTY

- A. Warranty: The pump manufacturer shall warrant the pumps being supplied to the Owner against defects in workmanship and materials for a period of one year under normal use, operation and service. Warranty period shall commence from date of final acceptance by Owner.

1.5 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. Operating and Maintenance Instructions: For all pumps furnished under this Section, the Contractor shall submit operation and maintenance manuals, in accordance with Section 01730 Operation and Maintenance Data.

PART 2 - GENERAL

2.1 MATERIALS

- A. All metal components in the wet well, with the exception of the pumps and motors shall be aluminum or 316 SS.
- B. Piping: Pipe and fittings within wetwell through to check valve in valve vault shall be fused PVC pipe with 316 stainless steel flanged fittings, as noted on the Drawings. .
 - 1. PVC pipe shall be C900 DR18 and shall be fused as one piece between pump base elbow and 90 degree bend in wet well, and from 90 degree bend in wet well to check valve in valve vault. 90 degree bend in wet well shall be flanged 316 stainless steel, sch 40. PVC piping ends shall utilize restrained flange adapter (Megaflange by EBAA iron or Town approved equal) with 316 stainless steel fasteners to connect to pump base elbow, 90 degree bed, and check valve, and as otherwise noted on drawings.
 - a. Pipe brace for parallel pump discharge piping and guide rails is required if more than one length of pipe is used or if discharge pipe is 4-inch diameter or greater. For wetwells 20 feet deep and greater, two braces shall be installed and spaced equally along depth of wetwell. Pipe brace shall consist 3"x3"x1/4" 316 stainless steel angle iron anchored to wetwell wall. Pipes shall be braced to angle iron with 3/8" 316 stainless steel "U" bolt, nuts and washer, or with stainless steel, double strap service saddles with 1" wide (min) stainless steel bands, stainless steel bolts, nuts and washers, two 2-inch stainless steel nipples, and one stainless steel ground joint union.
 - 2. Piping outside of the wetwell, within valve vault or above ground shall be PVC DR18 or Protecto 401 epoxy lined, Class 53, ductile iron pipe, as indicated on drawings. Fittings within valve vault or above ground shall be Protecto 401 epoxy lined ductile iron flanged fittings. Bolts, washers, and nuts shall be 316 stainless steel.
- C. All electrical systems and components (i.e., pump motors, cables, float switches) located in the pump station shall comply with the National Electric Code requirements for Class I, Group D, Division I

locations, and requirements of Division 16.

2.2 EQUIPMENT

A. Pumps:

1. The Contractor shall furnish and install motor driven totally submersible wastewater pumps as manufactured by Sulzer ABS to meet the requirements set forth in Table 11305-A through Table 11305-E: Submersible Pump Schedule.
2. Pump head-capacity curve shall be continuously falling from shutoff head.
3. A minimum NPSH margin ratio of 1.1 (NPSHa to NPSHr) for the proposed pumps shall be maintained over the full range of operation.
4. The pumps shall be capable of operating continuously under conditions from minimum flow up to runout flow. Pumps shall operate free of harmful vibration over the entire operating range.
5. Pump Design: The design shall be such that pumping units will be automatically connected to the discharge piping when lowered into place on the discharge connection. The pumps shall be easily removable for inspection or service, requiring no bolts, nuts or other fastening to be removed for this purpose and no need for personnel to enter pump well. Each pump shall be fitted with a 316 stainless steel wire rope or chain of adequate strength and length to permit raising the pump for inspection and removal.
6. Pump Construction:
 - a. The pump station shall be capable of handling solids, fibrous materials, heavy sludge, and other matter typically found in wastewater.
 - b. The stator casing, oil casing and impeller shall be of grey iron construction, with all parts coming into contact with wastewater protected by chlorinated rubber paint, 12 mils in thickness (minimum) or as recommended by manufacturer and approved by Engineer. All external bolts and nuts shall be of 316 stainless steel.
 - c. A wear ring designed for abrasion resistance shall be installed at the inlet of the pump to provide protection against wear to the impeller. The impeller shall be of a single vane, non-clog design capable of passing solids (up to 3-inch spheres) and fibrous material, and constructed with long throughway with no acute turns.
 - d. Each pump shall be provided with a tandem double mechanical seal running in an oil reservoir, composed of two separate lapped face seals, the lower consisting of one stationary and one rotating silicone carbide ring, the upper consisting of one stationary silicone carbide ring and one rotating carbon ring, with each pair held in contact by separate springs. The seals shall require neither maintenance nor adjustment and shall be easily replaceable. Conventional double mechanical seals with a single or double spring between the rotating faces, requiring constant differential pressure to effect sealing and subject to opening and penetration by pumping forces shall not be considered equal to the tandem seal specified and required.
 - e. A sliding guide bracket shall be a bolt on universal non-proprietary bracket or an integral part of the pumping unit and the pump casing shall be a machined connecting flange to connect with the cast iron discharge connection, which shall be bolted to the pump base plate and floor of the pump chamber and so designed as to receive the pump connecting

flange without the need of any bolts or nuts.

- f. Sealing of the pumping unit to the discharge connection shall be accomplished by a simple linear downward motion of the pump with the entire weight of the pumping unit guided by 316 stainless steel guide bar to and pressing tightly against the discharge connection; no portion of the pump shall bear directly on the floor of the sump and no rotary motion of the pump shall be required for sealing. Sealing at the discharge connection by means of a diaphragm, O-ring or similar method of sealing will be accepted as an equal to a metal contact of the pump discharge and mating discharge connection specified and required.
7. Pump Motor: The pump motor shall be housed in an air filled watertight casing and shall have Class H insulated windings, which shall be moisture resistant; the temperature at any point in the windings shall not exceed 155 degrees Centigrade (°C) at any load which could be imposed by the pump at any point on its curve. The motor shall be provided with over temperature sensors and shall be NEMA Design B. Pump motors shall have cooling characteristics suitable to permit continuous operation, in a totally, partially or non-submerged condition. The pump shall be capable of running dry continuously in a totally dry condition. Before final acceptance, a field running test demonstrating this ability, with 24 hours of continuous operation under the above conditions, shall be performed for all pumps being supplied, if required. The cable entrance seal shall be provided by a compression fitting. Cable junction box and motor shall be separated by a stator lead sealing gland or terminal board, which shall isolate motor from any water or solids gaining access through pump top. An epoxy potted cable entry system shall be considered equal. The pump shall not load the motor beyond its nominal (nameplate) rating at any point on the pump curve.
8. Cable: Pump motor cable shall be suitable for submersible pump applications and the rating shall be permanently embossed on the cable. Cable sizing shall conform to NEC requirement for the full load currents of the pump motors.
9. Control Panel for the Pump Station
See Division 16: Electrical
10. Level Control
 - a. Float Switches: See Division 16: Electrical.
 - b. Ultrasonic Level Measurement System: See Division 16: Electrical.

2.3 ACCESSORIES

A. Pump Access Frame and Guides:

1. The access frames, complete with hinged and hasp equipped covers, 316 stainless steel upper guide holders and 316 stainless steel level sensor cable holder with grip holders, shall be furnished and installed. The frames shall have a safety locking handle for locking in the open position. The covers shall be of checkered plate aluminum with a 300 lbs per square foot rating.
2. Lower guide holders shall be integral with discharge connection. Guide rails shall be of Schedule 40 316 SS pipe, of the size recommended by the pump manufacturer, and each rail shall be one piece.
3. All material used to fabricate the cover, frame, upper guide holder and cable holder shall be aluminum or 316 SS. All bolts, anchors, hinge pins and other fasteners shall be 316 SS.

B. Protective Grating Panel for Pump Access Hatch:

1. Wetwell pump access hatch clear openings are indicated on construction drawings. Hatch shall be fitted (or retrofitted) with fall protection by a protective grating panel if so indicated on construction drawings. Protective grating panel shall be as manufactured by US Foundry Manufacturing Corp or approved equal. Contractor shall verify that protective grating panel can be added to pump access hatch while maintaining necessary clearance and proper removal of pumps with required minimum pump separation and guide rail system.

C. Flow Meter

1. Flow meters shall be provided for pump stations as indicated on construction drawings. Flow meter shall be magnetic flow meter (indicating, totalizing, data transmission via SCADA and recording capabilities). Flow meter shall have flanged ends, remote transmitter, and unless otherwise noted, flow meter size shall match the connecting piping. Flow meter shall be Rosemount Magnetic Flowmeter system model 8705 (standard process sensor) with model 8712 remote mount transmitter. Reference electrical specifications (Division 16) and drawings for additional requirements. Installation shall be in accordance with manufacturer's recommended up and downstream pipe lengths.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. All materials and equipment shall be installed as shown on the Drawings and as recommended by the manufacturer.
- B. Additional items of construction, such as valve boxes, flanged adapters, thrust blocks, and other items necessary for the complete installation of the system shall conform to specific details on the Drawings and shall be constructed of first-class materials conforming to the applicable portions of these Specifications.

2.2 INSPECTION AND TESTING

- A. Field Tests: A qualified representative of the pumping system supplier shall inspect the installation and supervise start-up performed by the Contractor's personnel. All components of the system shall be tested for proper operation prior to and during the start-up operation. Representatives shall provide a written report to the Engineer verifying that all their equipment is properly installed and ready to start-up, prior to system start-up.
- B. Maintenance Procedures: After the equipment has been placed into operation, the qualified representative of the pump system supplier shall instruct the Owner's personnel in proper operating and maintenance procedures without additional cost to the Owner.

SUBMERSIBLE PUMPS SCHEDULE

TABLE 11305-A

Town of Ridgeland Pump Station		PS-3
a.	No. of Pumps Required	Two
b.	Pump Discharge Size, Inches	4 Inch
c.	Primary Condition	900 GPM @ 99 FT TDH
d.	Primary Min. Hydraulic Efficiency	67.60%
e.	Secondary Condition	1590 GPM @ 66 FT TDH
f.	Secondary Min. Hydraulic Efficiency	60%
g.	Shut Off Head Min., Feet	126 FT
h.	Motor, HP, Max	57.7 Hp
i.	Nominal Speed, RPM (max)	1180 RPM
j.	Service	Raw Wastewater
k.	Voltage, Volts	Reference Electrical
l.	Phase	Reference Electrical
m.	Frequency, Hertz	60
n.	Control Panel, Construction Material	Reference Electrical
o.	Level Sensor System	Ultrasonic Level Transducer with Backup Float Switches
p.	Approved Pump Selection	ABS Sulzer XFP105J-CB2 15 1/3" Imp

TABLE 11305-B

Town of Ridgeland Pump Station		PS-4
a.	No. of Pumps Required	Two
b.	Pump Discharge Size, Inches	4 Inch
c.	Primary Condition	350 GPM @ 92 FT TDH
d.	Primary Min. Hydraulic Efficiency	52.0%
e.	Secondary Condition	1040 GPM @ 63 FT TDH
f.	Secondary Min. Hydraulic Efficiency	67%
g.	Shut Off Head Min., Feet	134 FT
h.	Motor, HP, Max	24.8 Hp
i.	Nominal Speed, RPM (max)	1786 RPM
j.	Service	Raw Wastewater
k.	Voltage, Volts	Reference Electrical
l.	Phase	Reference Electrical

m.	Frequency, Hertz	60
n.	Control Panel, Construction Material	Reference Electrical
o.	Level Sensor System	Ultrasonic Level Transducer with Backup Float Switches
p.	Approved Pump Selection	ABS Sulzer XFP100G CB1 10 1/3" Imp

TABLE 11305-C

Town of Ridgeland Pump Station		PS-5
a.	No. of Pumps Required	Two
b.	Pump Discharge Size, Inches	1.25 Inch
c.	Primary Condition	25GPM @ 23 FT TDH
d.	Primary Min. Hydraulic Efficiency	26.0%
e.	Secondary Condition	43.5 GPM @ 27 FT TDH
f.	Secondary Min. Hydraulic Efficiency	12.5%
g.	Shut Off Head Min., Feet	108 FT
h.	Motor, HP, Max	2.41 Hp
i.	Nominal Speed, RPM (max)	3419 RPM
j.	Service	Raw Wastewater
k.	Voltage, Volts	Reference Electrical
l.	Phase	Reference Electrical
m.	Frequency, Hertz	60
n.	Control Panel, Construction Material	Reference Electrical
o.	Level Sensor System	Ultrasonic Level Transducer with Backup Float Switches
p.	Approved Pump Selection	ABS Sulzer Piranha S20/2D 5-2/3 Inch Imp

TABLE 11305-D

Town of Ridgeland Pump Station		PS-6
a.	No. of Pumps Required	Two
b.	Pump Discharge Size, Inches	4 Inch
c.	Primary Condition	350 GPM @ 88 Ft TDH
d.	Primary Min. Hydraulic Efficiency	55.0%
e.	Secondary Condition	1025 GPM @ 49 FT TDH
f.	Secondary Min. Hydraulic Efficiency	62%
g.	Shut Off Head Min., Feet	117 FT
h.	Motor, HP, Max	20.1 Hp

i.	Nominal Speed, RPM (max)	1783 RPM
j.	Service	Raw Wastewater
k.	Voltage, Volts	Reference Electrical
l.	Phase	Reference Electrical
m.	Frequency, Hertz	60
n.	Control Panel, Construction Material	Reference Electrical
o.	Level Sensor System	Ultrasonic Level Transducer with Backup Float Switches
p.	Approved Pump Selection	ABS Sulzer XFP100G CB1 10 Inch Imp

TABLE 11305-E

Town of Ridgeland Pump Station		PS-12
a.	No. of Pumps Required	Two
b.	Pump Discharge Size, Inches	4 Inch
c.	Primary Condition	100 GPM @ 27 Ft TDH
d.	Primary Min. Hydraulic Efficiency	41.0%
e.	Secondary Condition	450 GPM @ 14.5 FT TDH
f.	Secondary Min. Hydraulic Efficiency	61%
g.	Shut Off Head Min., Feet	36 FT
h.	Motor, HP, Max	2.68 Hp
i.	Nominal Speed, RPM (max)	1165 RPM
j.	Service	Raw Wastewater
k.	Voltage, Volts	Reference Electrical
l.	Phase	Reference Electrical
m.	Frequency, Hertz	60
n.	Control Panel, Construction Material	Reference Electrical
o.	Level Sensor System	Ultrasonic Level Transducer with Backup Float Switches
p.	Approved Pump Selection	ABS Sulzer XFP80C CB1 8-1/3" Imp

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SECTION 15000
MECHANICAL GENERAL REQUIREMENTS

PART I - GENERAL

1.1 DESCRIPTION

- A. Scope of Work:
1. All equipment furnished and installed under this contract shall conform to the general stipulations set forth in this section except as otherwise specified in other Sections.
 2. Contractor shall coordinate all details of 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 alternations in the Work required to accommodate equipment differing in dimensions or other characteristics from that contemplated in the Contract Drawings or Specifications.
- B. Contract Drawings and Specifications: The Contract Drawings and Specifications shall be considered as complementary, one to the other, so that materials and work indicated, called for, or implied by the one and not by the other shall be supplied and installed as though specifically called for by both. The Contract Drawings are to be considered diagrammatic, not necessarily showing in detail or to scale all of the equipment or minor items. In the event of discrepancies between the Contract Drawings and Specifications, or between either of these and any regulations or ordinances governing work of these specifications, the bidder shall notify the Engineer in ample time to permit revisions.

1.2 QUALITY ASSURANCE

- A. Materials and Equipment: Unless otherwise specified, all materials and equipment furnished for permanent installation in the work shall conform to applicable standards and specifications and shall be new, unused, and undamaged when installed or otherwise incorporated in the work. No such material or equipment shall be used by the Contractor for any purpose other than that intended or specified, unless such use is specifically authorized in writing by the Town. No material shall be delivered to the work site without prior acceptance of drawings and data by the Engineer.
- B. Equivalent Materials and Equipment:
1. Whenever a material or article is specified or described by using the name of a proprietary product or the name of a particular manufacturer or vendor, the specific item mentioned shall be understood as establishing the type, function, and quality desired. Other manufacturer's products may be accepted provided sufficient information is submitted to allow the Engineer to determine that the products proposed are equivalent to those named. Such items shall, be submitted for review in accordance with Section 01340: Shop Drawings, Working Drawings, and Samples.
 2. Requests for review of equivalency will not be accepted from anyone except the Contractor and such requests will not be considered until after the contract has been awarded.
- C. Governing Standards: Equipment and appurtenances shall be designed in conformity with ANSI, ASME, ASTM, IEEE, NEMA, OSHA, AGMA, and other generally accepted applicable standards. They shall be of rugged construction and of sufficient strength to withstand all stresses, which may occur during fabrication, testing, transportation, installation, and all conditions or operations. All bearings and moving parts shall be adequately protected against wear by bushings or other acceptable means. Provisions shall be made for adequate lubrication with readily accessible means.

- D. Tolerances: Machinery parts shall conform to the dimensions indicated on the drawings within allowable tolerances. Protruding members such as joints, corners, and gear covers shall be finished in appearance. All exposed welds shall be ground smooth and the corners of structural shapes shall be rounded or chamfered. Clearances: Ample clearances shall be provided for inspection and adjustment. All equipment shall fit the allotted space and shall leave reasonable access room for servicing and repairs. Greater space and room required by substituted equipment shall be provided by the Contractor and at his expense.
- E. Testing:
1. When the equipment is specified to be factory tested, the results of the tests shall be submitted to the Engineer and approval of the test results shall be obtained before shipment of the equipment.
 2. When an item of equipment, including controls and instrumentation, has been completely erected, the Contractor shall notify the Engineer, who will designate a time to make such tests as required, and operate the item to the satisfaction of the Engineer. All testing shall be done in the presence of the Engineer. "Completely erected" shall mean that the installation is erected, all necessary adjustments have been made, all required utility connections have been made, required lubricants and hydraulic fluid have been added and the unit has been cleaned and painted.
- F. Pressure Test:
1. After installation, all the piping shall be pressure tested.
 2. All tests shall be made in the presence of and to the satisfaction of the Engineer and also, to the satisfaction of any local or state inspector having jurisdiction.
 - a. Provide not less than three days notice to the Engineer and the authority having jurisdiction when it is proposed to make the tests.
 - b. Any piping or equipment that has been left unprotected and subject to mechanical or other injury in the opinion of the Engineer shall be retested in part or in whole as directed by the Engineer.
 - c. The piping systems may be tested in sections as the work progresses but no joint or portion of the system shall be left untested.
 3. All elements within the system that may be damaged by the testing operation shall be removed or otherwise protected during the operation.
 4. All defects and leaks observed during the tests shall be corrected and made tight in an approved manner and the tests repeated until the system is proven tight.
 5. Repair all damage done to existing or adjacent work or materials due to or on account of the tests.
 6. Provide test pumps, gauges, or other instruments and equipment required for the performance of all tests. Provide all temporary bracing, test plugs, additional restraint, and thrust blocking which may be required for test pressures above normal working pressures.
 7. All tests shall be maintained for as long a time as required to detect all defects and leaks but not less than the duration specified for each type of pipe or piping system in this Division.
- G. Failure of Test:

1. Defects: Any defects in the equipment, or deviations from the guarantees or requirements of the Specifications, shall be promptly corrected by the Contractor by replacements or otherwise. The decision of the Engineer as to whether or not the Contractor has fulfilled his obligations under the Contract shall be final and conclusive. If the Contractor fails to correct any defects or deviations, or if the replaced equipment when tested shall fail again to meet the guarantee or specified requirements, the Town, notwithstanding his having made partial payment for work and materials, which have entered into the manufacture for such equipment, may reject that equipment and order the Contractor to remove it from the premises at the Contractor's expense.
 2. Rejection of Equipment: In case the Town rejects a particular item of equipment, then the Contractor hereby agrees to repay to the Town all sums of money paid to him to deliver to the Contractor a bill of sale of all his rights, title, and interest in and to the rejected equipment provided, however that the equipment shall not be removed from the premises until the Town obtains from other sources other equipment to take the place of that rejected. The bill of sale shall not abrogate the Town's right to recover damages for delays, losses or other conditions arising out of the basic Contract. The Town hereby agrees to obtain the alternate equipment within a reasonable time and the Contractor agrees that the Town may use the original equipment furnished by him without rental or other charge until the other equipment is obtained.
- H. Responsibility During Tests: The Contractor shall be fully responsible for the proper operation of equipment during tests and instruction periods and shall neither have nor make any claim for damage which may occur to equipment prior to the time when the Town formally takes over the operation thereof.
- I. Acceptance of Materials:
1. Only new materials and equipment shall be incorporated in the work. All materials and equipment furnished by the Contractor shall be subject to the inspection and acceptance of the Town. No material shall be delivered to the work without prior submittal approval of the Engineer.
 2. The Contractor shall submit to the Engineer data relating to materials and equipment he proposes to furnish for the work. Such data shall be in sufficient detail to enable the Engineer to identify the particular product and to form an opinion as to its conformity to the specifications.
 3. Facilities and labor for handling and inspection of all materials and equipment shall be furnished by the Contractor. If the Engineer requires, either prior to beginning or during the progress of the work, the Contractor shall submit samples of materials for such special test as may be necessary to demonstrate that they conform to the specification. Such sample shall be furnished, stored, packed, and shipped as directed at the Contractor's expense. Except as otherwise noted, the Town will make arrangements for and pay for tests.
 4. The Contractor shall submit data and samples sufficiently early to permit consideration and acceptance before materials are necessary for incorporation in the work.
- J. Safety Requirements: In addition to the components shown and specified, all machinery and equipment shall be safeguarded in accordance with the safety features required by the current codes and regulations of ANSI, OSHA, and local industrial codes.

1.3 SUBMITTALS (See Section 01340: Shop Drawings, Working Drawings and Samples)

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Packaging: All equipment shall be suitably packaged to facilitate handling and protect against damage during transit and storage. All equipment shall be boxed, crated, or otherwise completely enclosed and protected during shipment, handling, and storage. All equipment shall be protected from exposure to

the elements and shall be kept thoroughly dry at all times.

- B. Protection: All machined surfaces and shafting shall be cleaned and protected from corrosion by the proper type and amount of coating necessary to assure protection during shipment and prior to installation. Painted surfaces shall be protected against impact, abrasion, discoloration, and other damage. All painted surfaces, which are damaged prior to acceptance of equipment, shall be repainted to the satisfaction of Engineer.
- C. Lubrication: Grease and lubricating oil shall be applied to all bearings and similar items as necessary to prevent damage during shipment and storage.
- D. Marking: Each item of equipment shall be tagged or marked as identified in the delivery schedule or on the Shop Drawings. Complete packing lists and bills of material shall be included with each shipment.
- E. Fabricated sub-assemblies, if any, shall be shipped in convenient sections as permitted by carrier regulations and shall be properly match-marked for ease of field erection.
- F. Responsibility:
 - 1. The Contractor shall be responsible for all material, equipment, and supplies sold and delivered to the site under this Contract until final inspection of the work and acceptance thereof by the Town. In the event any such material, equipment, and supplies are lost, stolen, damaged, or destroyed prior to final inspection and acceptance, the Contractor shall replace same without additional cost to the Town.
 - 2. Should the Contractor fail to take proper action on storage and handling of equipment supplied under this Contract within seven (7) days after written notice to do so has been given, the Town retains the right to correct all deficiencies noted in previously transmitted written notice and deduct the cost associated with these corrections from the Contractor's Contract. These costs may be comprised of expenditures for labor, equipment usage, administrative, clerical, engineering, and any other costs associated with making the necessary corrections.
- C. Delivery: The Contractor shall arrange deliveries of products in accordance with construction schedules and coordinate to avoid conflict with work and condition at the site.
 - 1. The Contractor shall deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
 - 2. Immediately on delivery, the Contractor shall inspect shipments to assure compliance with requirements of Contract Documents and accepted submittals, and that products are properly protected and undamaged.
 - 3. Under no circumstances shall the Contractor deliver equipment to the site more than one month prior to installation without written authorization from the Engineer. Operation and maintenance data shall be submitted to the Engineer for review prior to shipment of equipment as described in Section 01730: Operating and Maintenance Data.
- H. Storage and Protection of Products:
 - 1. The Contractor shall furnish a covered, weather-protected storage structure providing a clean, dry non-corrosive environment for all mechanical equipment, valves, architectural items, electrical and instrumentation equipment, and special equipment to be incorporated into this project. Storage of equipment shall be in strict accordance with the "Instructions for Storage" of each equipment supplier and manufacturer including connection of space heaters, and placing of storage lubricants in equipment. Corroded, damaged, or deteriorated equipment and parts shall be replaced before acceptance of the project. Equipment and materials not properly stored will

not be included in a payment estimate.

- a. The Contractor shall store products subject to damage by the elements in weather-tight enclosures.
 - b. The Contractor shall maintain temperature and humidity within the ranges required by manufacturer's instructions. The Contractor shall store fabricated products above the ground, on blocking or skids, to prevent soiling or staining. The Contractor shall cover products, which are subject to deterioration with impervious sheet coverings and provide adequate ventilation to avoid condensation.
 - c. The Contractor shall store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.
2. All materials and equipment to be incorporated in the work shall be handled and stored by the Contractor before, during, and after shipment in a manner to prevent warping, twisting, bending, breaking, chipping, rusting, and any injury, theft, or damage of any kind whatsoever to the material or equipment.
 3. Cement, sand, and lime shall be stored under a roof and off the ground, and shall be kept completely dry at all times. All structural and miscellaneous steel and reinforcing steel shall be stored off the ground or otherwise to prevent accumulations of dirt, or grease, and in a position to prevent accumulations of standing water, staining, chipping, or cracking. Brick, block, and similar masonry products shall be handled and stored in a manner to reduce breakage, chipping, cracking and spalling to a minimum.
 4. All materials which, in the opinion of the Town's Representative, have become damaged and are unfit for the use intended or specified, shall be promptly removed from the site of the work, and the Contractor shall receive no compensation for the damaged material or its removal.
 5. The Contractor shall arrange storage in a manner to provide easy access for inspection. The Contractor shall make periodic inspections of stored products to assure products are maintained under specified conditions, and free from damage or deterioration.
 6. Protection after Installation: The Contractor shall provide substantial coverings as necessary to protect installed products from damage from traffic and subsequent construction operations. The Contractor shall remove covering when no longer needed.

1.5 WARRANTY AND GUARANTEES

The manufacturer's written warranty shall be submitted for all major pieces of equipment, as specified in Section 01740: Warranties and Bonds. The manufacturer's warranty period shall be concurrent with the Contractor's correction period for one year after the time of completion and acceptance.

1.6 SPARE PARTS

Spare parts for certain equipment provided under Division 11 — Equipment and Division 15 — Mechanical have been specified in the pertinent sections of the specifications. The Contractor shall collect and store all spare parts in an area to be designated by the Engineer or Town's Representative. In addition, the Contractor shall furnish to the Engineer an inventory listing of all spare parts, the equipment they are associated with, and the name and address of the supplier.

1.7 MAINTENANCE MATERIALS

All grease, oil, and fuel required for testing of equipment shall be furnished with the respective equipment. The Town shall be furnished with a year's supply of required lubricants including grease and oil of the type

recommended by the manufacturer with each item of equipment supplied.

PART 2- PRODUCTS

2.1 FABRICATION AND MANUFACTURE

A. Workmanship and Materials:

1. Contractor shall guarantee all equipment against faulty or inadequate design, improper assembly or erection, materials, defective workmanship or materials and leakage, breakage or other failure. Materials shall be suitable for service conditions.
2. All equipment shall be designed, fabricated, and assembled in accordance with recognized and acceptable engineering and shop practice. Individual parts shall be manufactured to standard sizes and gages 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.
3. Except where otherwise specified, structural and miscellaneous fabricated steel used in equipment shall conform to AISC standards. All structural members shall be designed for shock or vibratory loads. Unless otherwise specified, all steel which will be submerged, all or in part, during normal operation of the equipment shall be at least ¼-inchthick.

B. Lubrication:

1. Equipment shall be adequately lubricated by systems, which require attention no more frequently than weekly during continuous operation. Lubrications systems shall not require attention during startup or shutdown and shall not waste lubricants.
2. Lubricants of the type recommended by the equipment manufacturer shall be furnished by the Contractor in sufficient quantity to fill all lubricant reservoirs and to replace all consumption during testing, startup, and operation prior to acceptance of equipment by Town. Unless otherwise specified or permitted, the use of synthetic lubricants will not be acceptable.
3. 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.

C. 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 gage 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.

D. Equipment Foundation Supports:

1. All foundations, platforms and hangers required for the proper installation of equipment shall be furnished and installed by the Contractor, unless otherwise indicated or specified, all equipment shall be installed on reinforced concrete bases at least 6 inches high. Cast iron or welded steel baseplates shall be provided for pumps, compressors, and other equipment. Each unit and its drive assembly shall be supported on a single baseplate of neat design. Baseplates shall have pads for anchoring all components and adequate grout holes. Baseplates for pumps shall have a means for collecting leakage and a threaded drain connection. Baseplates shall be anchored to the concrete base with suitable anchor bolts and the space beneath filled with grout as specified in Section 03600: Grout. All open equipment bases shall be filled with non-shrinking grout sloped to drain to the perimeter of the base.

2. The Contractor shall furnish, install and protect all necessary guides, bearing plates, anchor and attachment bolts, and all other appurtenances required for the installation of equipment. These shall be of ample size and strength for the purpose intended.
 3. 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 Section 05500: Miscellaneous Metals and, unless otherwise specified, shall have a minimum diameter of $\frac{3}{4}$ -inch. Unless otherwise indicated or specified, anchor bolts for items of equipment mounted on baseplates shall be long enough to permit 1-1/2 inches of grout beneath the baseplate and to provide adequate anchorage into structural concrete.
 4. Structural steel supports and miscellaneous steel required for supporting and/or hanging equipment and piping furnished under this Division shall be provided and installed by Contractor.
 5. All foundations, anchor pads, piers, thrust blocks, inertia blocks and structural steel supports shall be built to template and reinforced as required for loads imposed on them.
 6. The Contractor shall assume all responsibility for sizes, locations and design of all foundations, anchor pads, pier, thrust blocks, inertia blocks, curbs and structural steel supports.
- E. Shop Painting:
1. 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 smooth, 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 a high-grade oil-resistant enamel suitable for coating in the field with an alkyd enamel. Coatings shall be suitable for the environment where the equipment is installed.
 2. Surfaces to be painted after installation shall be prepared for painting as recommended by the paint manufacturer for the intended service, and then shop painted with one or more coats of the specified primer. Unless otherwise specified, the shop primer for steel and iron surfaces shall be Cook "391-N-167 Barrier Coat", Koppers "No. 10 Inhibitive Primer", or equal.
 3. Machined, polished, and nonferrous surfaces, which are not to be painted, shall be coated with rust- preventive compound, Houghton "Rust Veto 344N Rust-Oleum "R-9", or equal.
- F. Nameplates: Contractor shall provide equipment identification nameplates for each item of equipment. Unless otherwise noted, nameplates shall be 1/8-inch Type 304 stainless steel and shall be permanently fastened. Plates shall be fastened using round head metallic drive screws, or where metallic drive screws are impractical, with stainless steel pop rivets. Metallic drive screws shall be brass or stainless steel, Type V and No. 8 by 3/8- inch long. Names and/or equipment designations shall be engraved on the plates and the engraving painted with a primer and black paint system compatible with stainless steel. Contractor shall submit a list of proposed names and designations for review prior to fabrication of nameplates. At a minimum, each nameplate shall include equipment manufacturers name, year of manufacture, serial number and principal rating data.
- G. Pipe Identification: Underground pipe: All PVC pressure piping shall have a No. 10 solid copper tracer wire taped along the top of the pipe. The tracer wire shall be terminated at a maximum of 500-foot intervals with a ground level type box/lid and approximately 3 feet of coiled up wire inside each box along the entire length of the main.

2.2 ACCESSORIES

Special Tools and Accessories: Equipment requiring periodic repair and adjustment shall be furnished complete with all special tools, instruments, and accessories required for proper maintenance. Equipment requiring special devices for lifting or handling shall be furnished complete with those devices.

PART 3 - EXECUTION

3.1 INSTALLATION AND OPERATION

- A. Installation: Equipment shall not be installed or operated except by, or with the guidance of, qualified personnel having the knowledge and experience necessary for proper results. When so specified, or when employees of Contractor or his subcontractors are not qualified, such personnel shall be field representatives of the manufacturer of the equipment or materials being installed.
1. The Contractor shall have on site sufficient proper construction equipment and machinery of ample capacity to facilitate the work and to handle all emergencies normally encountered in work of this character. To minimize field erection problems, mechanical units shall be factory assembled when practical.
 2. Equipment shall be erected in a neat and workmanlike manner on the foundations and supports at the locations and elevations shown on the Drawings, unless otherwise directed by the Engineer during installation.
 3. All equipment shall be installed in such a manner as to provide access for routine maintenance including lubrication.
 4. For equipment such as pumping units, which require field alignment and connections, the Contractor shall provide the services of the equipment manufacturer's qualified mechanic, millwright, machinist, or authorized representative, to align the pump and motor prior to making piping connections or anchoring the pump base.
 5. Equipment of a portable nature, which requires no installation, shall be delivered to a location designated by the Town.
- B. Tolerances: Precision gauges and levels shall be used in setting all equipment. All piping and equipment shall be perfectly aligned, horizontally and vertically. Tolerances for piping and equipment installation shall be ¼-inch to 30 ft horizontal and vertically. All valves and operators shall be installed in the position shown on the Contract Drawings or as directed by the Engineer, if not shown.
- C. Alignment and Level: The equipment shall be brought to proper level by shims (1/4 inch maximum). After the machine has been leveled and aligned, the nuts on the anchor bolts shall be tightened to bind the machine firmly into place against the wedges or shims. Grouting shall be as specified in Section 03600: Grout.
- D. Grouting: The grout shall be tamped into position with a board, steel bar, or other tool. Tamping should not be so hard as to raise or otherwise displace the plate.
- E. Contact of Dissimilar Metals: Where the contact of dissimilar metal may cause electrolysis and where aluminum will contact concrete, mortar, or plaster, the contact surface of the metals shall be separated using not less than one coat of zinc chromate primer and one heavy coat of aluminum pigmented asphalt paint on each surface.
- F. Cutting and Patching: All cutting and patching necessary for the work shall be performed by the Contractor.

- G. Operation: All equipment installed under this Contract, including that furnished by Town or others under separate contract, shall be placed into successful operation according to the written instructions of the manufacturer or the instructions of the manufacturer's field representative. All required adjustments, tests, operation checks, and other startup activity shall be provided.

3.2 OBSERVATION OF PERFORMANCE TESTS

Where the specifications require observation of performance tests by the Engineer, such tests shall comply with the quality assurance paragraph in this section.

3.3 MANUFACTURERS FIELD SERVICES

A. Services Furnished Under This Contract:

1. An experienced, competent, and authorized representative of the manufacturer of each item of equipment shall visit the site of the Work and inspect, check, adjust if necessary, and approve the equipment installation. In each case, the manufacturer's representative shall be present when the equipment is placed in operation. The manufacturer's representative shall re-visit the job site as often as necessary until all trouble is corrected and the equipment installation and operation are satisfactory in the opinion of Engineer and/or Town's Representative.
2. Each manufacturer's representative shall furnish to Town and Engineer, a letter of certification stating that the equipment has been properly installed and lubricated; is in accurate alignment; is free from any undue stress imposed by connecting piping or anchor bolts; and has been operated under full load conditions and that it operated satisfactorily.
3. All costs for field services shall be included in the contract amount.

END OF SECTION

**SECTION 15045
PRESSURE TESTING**

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. This section specifies the leakage testing of pressure piping systems.
2. It is the intent of this specification section that all piping be pressure tested. At a minimum, the pipe shall be tested at 1.5 times the working pressure for a duration of two (2) hours, unless specified otherwise herein or in other specification Sections.

B. Test Pressures and Times: PVC, ductile iron, and stainless steel pipe for water, wastewater, or reclaimed water service mains shall be tested for a minimum of two (2) hours at 150 psi, unless otherwise required by Town.

C. HDPE Piping, if any, shall be pressure tested in accordance with the separate High-Density Polyethylene Pipe requirements.

D. The Contractor shall test pipelines installed under this Contract in accordance with these specifications prior to acceptance of the pipeline by the Town of Ridgeland or connecting pipeline to any existing pipeline or facility. All field tests shall be made in the presence of the Engineer and/or Town's Representative. Except as otherwise directed, all pipelines shall be tested.

All piping to operate under liquid pressure shall be tested in sections of approved length. For these tests, the Contractor shall furnish clean water, suitable temporary testing plugs or caps, and other necessary equipment, and all labor required. If the Contractor chooses to pressure test against an existing Town of Ridgeland main/valve, the Town of Ridgeland will not be responsible for failure of the pressure test due to the existing valve leaking. If positive test results cannot be obtained because the Town of Ridgeland valves will not hold the test pressures, the Contractor shall be required to disconnect from the Town of Ridgeland System and re-test independent of the Town of Ridgeland System and at the Contractor's expense.

E. Testing Records:

1. Provide record of each piping installation during the testing. These records shall include:
 - a. Date of test.
 - b. Identification of pipeline tested or retested.
 - c. Identification of pipeline material.
 - d. Identification of pipe section tested.
 - e. Test pressure.
 - f. Remarks: Leaks identified (type and location), types of repairs, or corrections made.
 - g. Certification by Contractor that the leakage rate measured conformed to the specifications.
 - h. Signature of Town's representative witnessing pipe test.

2. Submit three (3) copies of the pressure test form to the Town's representative upon completion of the testing.

PART 2 – PRODUCTS

2.01 GENERAL:

- A. Testing fluid shall be water.
- B. The Contractor will use suitable pressure gauges, calibrated by an approved testing laboratory, with increments no greater than 2 psi. Gauges used shall be of such size that pressures tested will not register less than 10% nor more than 90% of the gauge capacity. Leakage and pressure testing shall be in accordance with AWWA C600 and as outlined below.

2.02 MATERIALS AND EQUIPMENT

- A. Provide pressure gauges, pipes, bulkheads, pumps, and meters to perform the hydrostatic testing.

PART 3 – EXECUTION

3.01 TESTING PREPARATION

- A. Pipes shall be in place and anchored before commencing pressure testing.
- B. Conduct hydrostatic tests on exposed and above ground piping after the piping has been installed and attached to the pipe supports, hangers, anchors, expansion joints, valves and meters.
- C. Before conducting hydrostatic tests, flush pipes with water to remove dirt and debris.
- D. Test new pipelines which are to be connected to existing pipelines by isolating the new line from the existing line by means of pipe caps, special flanges, or blind flanges. After the new line has been successfully tested and cleared by relevant regulatory agencies, remove caps or flanges and connect to the existing piping.
- E. Conduct hydrostatic tests on buried pipe after the trench has been completely backfilled. The pipe may be partially backfilled and the joints left exposed for inspection for an initial leakage test. Perform the final test, however, after completely backfilling and compacting the trench.

3.02 TESTING

- A. Unless it has already been done, the section of pipe to be tested shall be filled with water of approved quality and all air shall be expelled from the pipe. If blow offs or other outlets are not available at high points for releasing air, the Contractor shall make the necessary taps at such points and shall plug said holes after completion of the test.
- B. Hydrostatic testing shall consist of a combined pressure test and leakage test. Specified test pressures, based on the elevation of the highest point of the line or section under test, and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Engineer. The pump, pipe connection and all necessary apparatus, shall be furnished by the Contractor and shall be subject to the approval of the Engineer. All valved sections shall be hydrostatic tested to insure sealing (leak allowance) of all line valves.
 1. All piping shall be pressure and leakage tested for a minimum of two hours duration at the test pressure noted in paragraph 1.01 for the relevant type of service. Pressure tests shall be

conducted with a pressure loss of not more than 5 psi regardless of length being tested. No pipe will be accepted if pressure loss is greater than 5 psi. regardless of leakage test results. All exposed pipe, fittings, valves and joints shall be examined carefully during the test. Any damaged or defective pipe, fittings or valves that are discovered following the pressure test shall be repaired or replaced with sound material and the test shall be repeated until it is satisfactory. Repairing, replacing and retesting shall be done at the Contractor's expense.

- 2. Leakage tests shall be conducted simultaneously with the pressure tests. At the end of the pressure test, the line will be pumped back to initial test pressure. The quantity of water used to repump the line shall be measured and compared to the limitations calculated using the leakage equation below. No pipe installation will be accepted if the leakage is greater than determined by the following formula which is applicable to DIP, PVC, or combination of both:

$$L = \frac{SD P^{1/2}}{148,000}$$

In which L is the allowable leakage in gallons per hour; S is the length of pipeline tested, in feet; D is the nominal diameter of the pipe, in inches; and P is the average test pressure during the leakage test, in pounds per square inch. If any test discloses leakage greater than that specified above, the Contractor shall, at its own expense, locate and repair the defective material and retest until the leakage is within the specified allowance.

In the event a section fails to pass the tests, the Contractor shall do everything necessary to locate, uncover (even to the extent of uncovering the entire section), and replace the defective pipe, valve, fitting or joint. Visible leaks shall be corrected regardless of total leakage. Lines which fail to meet these tests shall be retested as necessary until test requirements are complied with. All testing shall be performed at the Contractor's expense.

- 6. If, in the judgment of the Engineer, it is impracticable to follow the foregoing procedures exactly for any reason, modifications in the procedure shall be made with approval; but, in any event, the Contractor shall be responsible for the ultimate tightness of the piping within the above requirement. For water mains, re-disinfection shall be required if the line is de-pressurized for repairs prior to tying into the Town of Ridgeland system.

END OF SECTION

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**SECTION 15301
MECHANICAL EQUIPMENT - GENERAL**

PART 1 - GENERAL

1.1 SCOPE

The work to be performed under this section consists of furnishing all materials and equipment, and performing all necessary services for a complete, operable installation of all mechanical and control equipment delineated hereinafter and in strict accordance with the Contract Documents and the approved manufacturer's shop drawings.

PART 2 – PRODUCT (NOT USED)

PART 3 - EXECUTION

3.1 PIPE LOCATION

- A. Exterior pipelines will be located substantially as indicated on the Contract Drawings, but the right is reserved by the Town, acting through the Engineer, to make such modifications in location as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings, etc., are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve him from laying and jointing different or additional items where required without additional compensation.
- B. All piping shown on the Contract Drawings, except as noted below, is indicated diagrammatically, and the exact location will be determined from approved shop drawings. Piping will be arranged in a neat, compact and workmanlike manner with a minimum of crossing and interlacing and, in general, without diagonal runs.
- C. Small interior piping is indicated diagrammatically on the Drawings and the exact location is to be determined in the field. Piping will be arranged in a neat, compact and workmanlike manner with a minimum of crossing and interlacing and, in general, without diagonal runs.

3.2 BOLTS, ANCHOR BOLTS AND NUTS

- A. All anchor bolts, anchor bolt templates and location drawings required for the installation of the equipment, support columns, and for all other equipment or machinery included under this Contract will be furnished by the Contractor and/or the equipment manufacturer under this Contract. Anchor bolts, sleeves and inserts will be set in place in forms and cast in the concrete by the General Contractor. It will be the responsibility of the equipment manufacturers under this Contract to furnish such anchor bolts, templates and approved location drawings in proper time to avoid delay, and it will be his further responsibility to check and approve the location and setting of the anchor bolts, sleeves and inserts prior to the casting of the concrete. Parts of anchors of metal work that are not built into masonry and concrete will be coated with approved red lead paint. Anchor bolts for column base plates and other structural elements will be of steel; anchor bolts for drives, motors, fans, blowers and other mechanical equipment will be of Type 316 Stainless Steel or high strength bronze. Anchor bolts will be of ample size and will be provided with hexagonal nuts of the same quality of metal as the bolts. All threads will be clean cut and of United States Standard size. All anchor bolts, washers and nuts will be Type 316 Stainless Steel. During installation of stainless steel bolts & nuts, the Contractor will apply a never-seize type compound to the threads before tightening assemblies together.
- B. Expansion bolts will have malleable iron and lead composition elements of the required number of units and size. Expansion bolts, if required, will be furnished and installed under this Contract. Unless otherwise specified, stud, tap and machine bolts will be of the best quality refined bar iron. Hexagonal

nuts of the same quality of metal as the bolts will be used. All threads will be clean cut and will conform to ANSI Standard B1.1-1949 for Unified and American Screw Threads for Screws, Bolts, Nuts and Other Threaded Parts.

- C. Bolts, anchor bolts, nuts and washers not specified to be stainless steel will be zinc-coated after being threaded by the hot dip method process in conformity with the ASTM A123 (latest edition) for Zinc (Hot Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars and Strips, or ASTM A153 (latest edition) for Zinc-Coating (Hot Dip) on Iron and Steel Hardware, as is appropriate.
- D. Anchor bolts and expansion bolts will be set accurately. If anchor bolts are set before the concrete has been placed, they will be carefully held in suitable templates of approved design provided under this Contract. Where indicated on the Drawings, specified, or required, anchor bolts will be provided with square plates at least four inches (4") by four inches (4") by three-eighth inches (3/8") or will have square head and washers and be set in the concrete forms with suitable pipe sleeves, or both. If anchor or expansion bolts are set after the concrete has been placed, all necessary drilling and grouting or caulking will be done at the Contractor's expense under this Contract, and care will be taken not to damage the structure or finished by cracking, chipping, spalling or otherwise during the drilling and caulking.

3.3 CONCRETE INSERTS

Concrete inserts will be designed to support safely, in the concrete that is used, the maximum load that can be imposed by the hangers used in the inserts. Inserts will be of a type which will permit adjustment of the hangers both horizontally (in one plane) and vertically and locking of the hanger head or nut. All inserts will be galvanized.

3.4 SLEEVES

- A. Unless otherwise indicated on the Drawings or specified, openings for the passage of pipes through floors and walls will be formed of sleeves of standard-weight, galvanized steel pipe. The sleeves will be of an ample diameter to pass the pipe and its insulation, if any, and to permit such expansion as may occur. Sleeves will be of sufficient length to be flush at the walls and the bottom of slabs and to project one (1) inch above the finished floor surface. Threaded nipples will not be used as sleeves.
- B. Sleeves in exterior walls below grade or in walls to have water, sewage or wastes on one or both sides will have a two inch (2") annular fin of 1/8 inch (1/8") plate welded with a continuous weld completely around the sleeve at about mid-length.
- C. All sleeves will be set accurately before the concrete is placed or will be built-in accurately as the masonry is being built.

3.5 FOUNDATIONS. INSTALLATION ANDGROUTING

- A. The Contractor will furnish the necessary materials and construct suitable concrete foundations for all equipment installed by him at no additional cost to the Town, even though such foundations may not be indicated on the Drawings. The tops of the foundations will be at such elevations as will permit grouting as specified below.
- B. All equipment will be installed by skilled mechanics and in accordance with the instructions of the manufacturer.
- C. In setting pumps, motors and other items of equipment customarily grouted, the Contractor will make an allowance of at least one (1") inch for grout under the equipment bases. Shims used to level and adjust the bases will be metal. Shims may be left embedded in the grout, in which case they will be brass or bronze and installed so as to be inconspicuous as possible in the completed work.

- D. Provide non-shrink type grout under all equipment bases.
- E. Unless indicated otherwise in other sections, grout will consist of one (1) part cement, two (2) parts or less of fine aggregate, and the minimum quantity of water necessary to permit the grout to be properly placed. Where practical, the grout will be placed through the grout holes in the base and worked outward and under the edges of the base and across the rough top of the concrete foundation to a peripheral form so constructed as to provide a suitable chamfer around the top edge of the finished foundation. Where such procedure is impractical, the method of placing grout will be as approved. After the grout has hardened sufficiently, all forms, hoppers, and excess grout will be removed, and all exposed grout surfaces will be patched in an approved manner, if necessary, and given a burlap-rubbed finish.

3.6 SERVICES OF MANUFACTURER'S REPRESENTATIVE

- A. The Contractor will arrange for a qualified service representative from the company manufacturing or supplying certain equipment as listed below, to perform the duties herein described.
- B. After installation of the listed equipment has been completed and the equipment is presumably ready for operation, but before it is operated by others, the representative will inspect, operate, test and adjust the equipment. The inspection will include, but will not be limited to, the following points as applicable:
 - 1. Soundness (without cracked or otherwise damaged parts).
 - 2. Completeness in all details, as specified.
 - 3. Correctness of setting, alignment, and relative arrangement of various parts.
 - 4. Adequacy and correctness of packing, sealing and lubricants.
 - 5. Correction of calibration, etc.

The operations, testing and adjustment will be as required to prove that the equipment is left in proper condition for satisfactory operation under the conditions specified.

- C. On completion of his work, the manufacturer's or supplier's representative will submit in triplicate to the Engineer, a complete signed report of the result of his inspection, operation, adjustments and tests. The report will include detailed descriptions of the points installed, tests and adjustments made, quantitative results obtained if such are specified and the suggestions for precautions to be taken to ensure proper maintenance. The report also will include a certificate that the equipment conforms to the requirements of the Contract and is ready for permanent operation and that nothing in the installation will render the manufacturer's warranty void and null. The manufacturer or supplier will file with his shop drawing submittal, an equipment warranty guaranteeing his equipment for a period of one (1) year from date of final acceptance of the equipment by the Town.
- D. The provisions of this section will apply, among others, to the following equipment:
 - 1. Pumping equipment.
 - 2. Emergency power generation.
 - 3. Instrumentation.

In addition to the above requirements, the Contractor will employ the services of a factory service engineer for the special service specified in this section.

3.7 STANDARDIZATION OF GREASE FITTINGS

The Contractor will ensure that all grease fittings on all pieces of equipment furnished under this Contract are standardized so that only the button-head type of fitting is used. Fittings will be standard or giant size according to the type of service to be performed. Unless otherwise approved, all fittings will be the product of one manufacturer.

3.8 NAMEPLATES

- A. With the exceptions mentioned below, each piece of equipment will be provided with a substantial nameplate of non-corrodible metal, securely fastened in place and clearly and permanently inscribed with the manufacturer's name, model or type designation, serial number, principal rated capacities, electrical or other power characteristics, and similar information as appropriate.
- B. This requirement will not apply to standard, manually operated hydrants; gates, globe, check and plug valves; or accessories and specialty not having an electrical connection.

3.9 OPERATING INSTRUCTIONS AND PARTSLIST

- A. The Contractor will furnish for each piece of equipment, five (5) complete, neatly bound sets giving the following listed below:
 - 1. Clear and concise instructions for the installation, operation, adjustment and lubrication and other maintenance of the equipment. These instructions will include a complete lubrication chart.
 - 2. List of all parts for the equipment with catalog numbers and other data necessary for ordering replacement parts.
 - 3. In addition to the above, the Contractor, prior to requesting payment for equipment stored on-site, will submit to the Engineer, a complete list of maintenance and spare parts requirements as specified below. For each piece of mechanical equipment furnished under this Contract, the following information will be supplied:
 - a. Complete part's list.
 - b. Complete set of preventive maintenance requirements as a function of running and/or elapsed time.
 - c. Complete set of lubrication instructions including schedule and quantity and type of lubricant (s).
 - d. Complete listing of consumable items sufficient for one (1) years' operation, i.e., light bulbs, belts, etc.
 - e. Recommended spare parts inventory.
 - 4. Identification of Valves:
 - a. Each shut-off or control valve installed in process piping systems will be provided with a 1-1/2 inch minimum diameter heavy brass tag. Each tag will bear the identifying number of the valves and, when so indicated in the Project Specifications and/or on the Contract Drawings, an identifying letter symbol of the serviceline.

The tags will be attached to the valve by split-key rings soldered so that ring and tag

cannot be removed. The numbers and letters will be block type, with ½ high numbers and ¼-inch high letters stamped thereon and filled with black enamel.

5. Valve Directories: The Contractor will furnish and install approved schematic pipe diagrams and valve directories for each process piping system. Each schematic pipe diagram will be single line showing the relative position of valves, valve numbers and the direction of flow. Each directory will show each valve number and the location of each valve. Each diagram and directory will be on approved material and framed in a glazed frame with screw eyes and wires for hanging and will be located as directed by the Engineer.
- B. Such instructions and part's list will have been prepared for the specific equipment furnished and will not refer to other sizes and types or models of similar equipment.

3.10 LUBRICANTS

The Contractor will furnish all lubricants used during testing and prior to acceptance, and in addition, he will furnish an estimated six (6) months supply of all grease and oil necessary for the proper lubrication of all equipment furnished under this Contract. Lubricants for this supply will be furnished in the original sealed containers, each correctly identified as to brand and grade with reference to the particular piece of equipment for which it is intended.

3.11 TOOLS

- A. For each type of equipment furnished by the Contractor, he will provide a complete set of all special tools (including grease guns, or other lubricating devices), which may be necessary for the adjustment, operation, maintenance and disassembling of such equipment. Tools will be a high grade, smooth, forged, alloy, tool steel.

3.12 PATENTS

- A. General: The Contractor will guarantee to the Town that all equipment offered under these Specifications, or that any process resulting from the use of such equipment in the manner stated, is not subject of patent litigation, and that he is not knowingly offering equipment, the installation, or use of which is likely to result in a patent controversy, in which the Town, as user, is likely to be made the defendant.
- B. License: Where patent infringements are likely to occur, each Contractor will submit, as a part of his bid, license arrangements between himself, and the manufacturer of the equipment offered, and the patent Town or the controller of the patent, which will permit the use in the specified manner of such mechanical equipment as he may be bidding upon.
- C. Liability: Each Contractor, by submitting his bid, agrees to hold and save the Town or its officers, agents, servants and employees harmless from liability of any nature or kind including cost and expenses for or on account of any patented or un-patented invention, process, article, or appliance manufactured or used in the performance of the work under this contract including the use of same by the Town.

3.13 PIPING AND CONNECTIONS

- A. Equipment will be oriented and connected as indicated on the drawings. Deviations from dimensions and arrangements shown on the Drawings caused by equipment characteristics will be shown on completely dimensioned layouts and submitted by the Contractor to the Engineer for approval prior to installation of the equipment. The approved deviation and all related changes in piping, conduits, supports, etc., will be made at no additional cost to the Town.
- B. Electrical connections will be performed as specified under Division 16, ELECTRICAL.

3.14 ELECTRIC MOTORS

See Division 16: Electrical

3.15 SUBMISSION OF APPROVAL DATA WITH BID

- A. It will be the Contractor's responsibility to submit with his bid, complete information on the equipment offered. In the case of equipment listed or specified herein, this may be a statement to the effect that the equipment being offered meets the Specifications and conforms with the plans in every detail, any and all exceptions will be listed so that a decision may be made prior to award, otherwise, it will be assumed the equipment conforms to these Specifications in every respect. This will not relieve the Contractor of Shop Drawing submittals as set forth in the Specifications.
- B. For equipment not listed or specified herein, complete Shop Drawings and Specifications will be filed, listing or showing weights, thicknesses, material, performance characteristics, etc.
- C. For pumps, the manufacturer's material will show the manufacturer of the motor (s) and for all pumps more than 45 g.p.m., a guaranteed performance curve and/or other data required in the paragraphs delineating the pump (s).

3.16 MATERIAL TO BE OBTAINED FROM THE MANUFACTURER

- A. The Contractor will obtain all items named in these Specifications or so noted on the plans from the equipment manufacturer and such incidental items as may be required for the safe and proper operation of the equipment for the purpose (s) intended.
- B. Shop Drawings will not be approved until all materials are listed along with the names and catalog numbers of any units being furnished by separate manufacturers.
- C. Equipment offered contrary to the provisions of this paragraph will be subject to rejection.

3.17 CUTTING AND PATCHING

- A. The Contractor will leave all chases or openings for the installation of his own or any other contractor's or subcontractor's work, or will cut the same in existing work, and will see that all sleeves or forms are at the work and properly set in ample time to prevent delays. He will see that all such chases, openings, and sleeves are located accurately and are of proper size and shape and will consult with the Engineer and the contractors or subcontractors concerned in reference to this work.
- B. In case of his failure to leave or cut all such openings or have all such sleeves provided and set in proper time, he will cut or set them afterwards at his own expense, but in so doing, he will confine the cutting to the smallest extent possible, consistent with the work to be done. In no case will piers or structural members be cut without consent and the approval of the Engineer.
- C. The Contractor will carefully fit around, close up, repair, patch and point around the work specified herein to the entire satisfaction of the Engineer.
- D. All of this work will be done by careful workmen, competent to do such work and with the proper small hand tools. Power tools will not be used except where the type of tool proposed can be used without damage to the structure beyond the limits of the work.
- E. Except with the consent of the Contractor or subcontractor involved, given in writing or in the presence of the Engineer, the Contractor will not himself, and will not permit his subcontractors to cut or alter the work of any other contractor or subcontractor. All cutting and patching or repairing made necessary by the negligence, carelessness or incompetence of the Contractor or any subcontractor will be done at

the expense of the Contractor at fault.

END OF SECTION 15301

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SECTION 16000
ELECTRICAL

16010 - BASIC ELECTRICAL REQUIREMENTS

1.01 QUALITY ASSURANCE

- A. All electrical work shall be in accordance with the following codes and agencies:
 - 1. The National Electrical Code (NFPA-70), 2020 Edition with South Carolina modifications.
 - 2. The International Building Code, 2021 Edition with South Carolina modifications.
 - 3. Regulations of the local utility company concerning metering and service entrance.
 - 4. State and local ordinances governing electrical work.
- B. All materials shall be new and shall conform to standards where such have been established for the particular material. All UL listed equipment shall bear the UL label.

1.02 PERMITS

- A. Obtain all permits and inspections required for the work involved. Deliver to the owner all certificates of inspection.

1.03 WARRANTY

- A. The contractor shall warrant to the owner that all work shall be free from defects and will conform to the contract documents. This warranty shall extend not less than one year from the date of beneficial occupancy.

1.04 DESCRIPTION

- A. The work covered by this Section of these Specifications includes but is not necessarily limited to the following items of work:
 - 1. Electrical service, distribution equipment and control equipment for pump stations and well.
 - 2. Coordination with utility for power and metering.
 - 3. Provide SCADA system in accordance with Town of Ridgeland requirements.

1.05 SCOPE OF WORK

- A. This section of the specifications covers the complete electrical systems as indicated on the drawings or as specified herein. Provide all materials, labor, equipment, and supervision to install electrical systems. The work shall consist of, but shall not be limited to, the installation of the following:

1. Install new service, electrical distribution, and control equipment for a new pump station, equipment and well.
2. Coordination with utilities for power service indicated.

1.06 RELATED WORK SPECIFIED ELSEWHERE

- A. Refer to the Civil specifications and Special Conditions for other items of work necessary to complete the electrical installation.

1.07 CUTTING, PATCHING, EXCAVATING & BACKFILLING

- A. All cutting and patching required to carry out the work shall be provided under other Specification Sections.
- B. All excavation and backfilling required to install conduit shall be provided under this Section. Backfill shall be compacted as required under other Specification Sections.

1.08 DRAWINGS

- A. The drawings indicate the general arrangement of electrical equipment, based on one manufacturer's product. Coordinate installation of equipment with all other trades. Do not scale drawings for connection locations. Bring all discrepancies to the immediate attention of the Engineer.
- B. Contractor shall install and circuit all electrical work as indicated on drawings unless specific building construction requires a change or rerouting of this work. He shall keep a record of the location of all concealed work, including the underground utility lines. He shall document all changes in the manner specified by the General Conditions, Special Conditions and Supplementary General Conditions to the Mechanical and Electrical Work.

1.09 EQUIPMENT REQUIRING ELECTRICAL SERVICE

- A. Review all specification sections and drawings for equipment requiring electrical service. Provide service to and make connections to all such equipment.
- B. Drawings are based on design loads of one manufacturer. If equipment actually furnished have loads, numbers of connections, or voltages other than those indicated on the drawings, then control equipment, feeders, and overcurrent devices shall be adjusted as required, at no additional cost to the owner. Such adjustments are subject to review by the Engineer.
- C. Catalog numbers indicated with equipment, devices and lighting fixtures are for convenience only. Errors or obsolescence shall not relieve the furnishing of items which meet the technical description given in specifications, noted, or required by function designated.

1.10 MECHANICAL SYSTEM INTERFACE

- A. All control wiring for HVAC equipment shall be installed under Division 16. Power wiring to all motors and motor controllers and between motors and controllers shall be provided under Division 16000. All motor controllers shall be furnished and installed under Division 16000.

1.11 SITE INVESTIGATION

- A. Prior to submitting bids for the project, visit the site to become familiar with existing conditions. The project shall be restored to its existing condition, with the exception of work under this contract, prior to final payment.

1.12 PRODUCT DELIVERY, STORAGE, HANDLING, AND PROTECTION

- A. Provide a dry, weather tight space for storing materials. Store packaged materials in original undamaged condition with manufacturer's labels and seals intact. Handle and store material in accordance with standards to prevent damage. Equipment and materials shall not be installed until such time as the environmental conditions of the job site are suitable. Replace damaged materials.

1.13 CLEANING AND PAINTING

- A. Remove oil, dirt, grease and foreign materials from all equipment to provide a clean surface. Touch up scratched or marred surfaces of lighting fixtures, panelboard and cabinet trims, and equipment enclosures with paint manufactured specifically for that purpose.

1.14 RECORD DRAWINGS

- A. At the time of final inspection, provide three (3) sets of data on electrical equipment used in the project. This data shall be in bound form and shall include the following items:
 1. Shop drawings on equipment listed.
 2. Data sheets indicating electrical characteristics of all devices.
 3. Data sheets on all lighting fixtures indicating voltage, illumination source used in each fixture.
 4. Test results required by "Electrical Systems Operation Test."

1.15 ELECTRICAL SYSTEMS OPERATIONAL TEST

- A. Prior to final inspection, the following systems or equipment shall be tested and reported as herein specified.
 1. Each ground rod installation shall be tested after all connection to ground rods are made. Ground rod installations shall be tested by "fall of potential"

measuring method using ground resistance test meter and two auxiliary electrodes driven into the earth, interconnected through the meter with the ground rod installation being tested. Placement of auxiliary electrodes shall be in accordance with operating instructions of test meter, but in no case shall auxiliary current electrodes be placed within seventy feet of the grounding system being tested. Test data shall indicate placement of auxiliary electrodes with respect to system being tested, data readings were taken and lowest resistance recorded.

2. Three (3) typewritten copies of the test shall be submitted to the Engineer for approval.

1.16 MATERIALS

A. Materials or equipment specified by manufacturer's name shall be used unless approval of other manufacturer is listed in addendum to these specifications. Request for approval of substitute materials shall be submitted in writing to the Engineer at least ten (10) days prior to bid opening.

1. Where substitution of materials alters space requirements indicated on the drawings, submit shop drawings indicating proposed layout of space, all equipment to be installed therein, and clearances between equipment. All clearances required by the National Electrical Code must be maintained.
2. All material shall be new and shall conform to the applicable standard or standards where such have been established for the particular material in question. Publications and Standards of the organizations listed below are applicable to materials specified herein.
 - a. American Society for Testing and Materials (ASTM)
 - b. Underwriter's Lab (UL)
 - c. National Electrical Manufacturer Association (NEMA)
 - d. Insulated Power Cable Engineers Association (IPCEA)
 - e. Institute of Electrical and Electronic Engineers (IEEE)
 - f. Edison Electric Institute (EEI)
 - g. National Fire Protection Association (NFPA)
 - h. American National Standards Institute (ANSI)
3. Material of the same type shall be the product of one manufacturer.
4. U.L. listed material shall bear a U.L. label.

1.17 SHOP DRAWINGS

A. The Contractor shall submit for review by the Engineer a complete schedule and data of materials and equipment to be incorporated in the work. Submittals shall be supported by descriptive material, such as catalogs, cuts, diagrams, performance curves, and charts published by the manufacturer, to show conformance to specification and drawing requirements; model numbers alone will not be acceptable. Complete electrical characteristics shall be provided for all equipment.

B. Submittals shall be made for each of the following items:

Panelboards	Enclosed Circuit Breakers
Generators	Automatic Transfer Switches
Conduit	Wiring Devices
Lighting Fixtures	Surge Protection
Junction Boxes	Support Channels
Conductors	Disconnect Switches
SCADA	Reduced Voltage Solid State Starters
Transformers	FVNR Starters
Cable Grips	Control Panel Material List

- C. Each individual submittal item for materials and equipment shall be marked to show specification section and paragraph number which pertains to the item.
- D. Prior to submitting shop drawings, review the submittal for compliance with the Contract Documents and place a stamp or other confirmation thereon which states that the submittal complies with Contract requirements. Submittals without such verification will be returned disapproved without review.

1.18 SERVICE

- A. Electrical service shall be:
 1. 208/120V, 3-phase, 4-wire, Wye
 2. 480/277V, 3-phase, 4-wire, Wye
- B. The electrical service shall be:
 1. Underground, originating in the secondary compartment of a utility furnished pad mounted transformer or utility pedestal.
 2. Aerial, originating in a weatherhead installed adjacent to the termination of a utility furnished secondary service drop.
 3. Refer to the drawings for the site specific service voltage and method.
- C. Complete metering systems shall be provided. Install the system in accordance with the utility standards. Coordinate meter location with local utility and provide channel rack for mounting of meter.

1.19 SHORT CIRCUIT/COORDINATION STUDY/ARC FLASH HAZARD ANALYSIS

- A. Scope
 1. The contractor shall furnish short-circuit and protective device coordination studies which shall be prepared by the equipment manufacturer.
 2. The contractor shall furnish and Arc Flash Hazard Analysis Study per NFPA 70E – Standard for Electrical Safety in the Workplace, reference Article 130.3 and Annex D.
- B. Submittals For Construction

1. The results of the short-circuit, protective device coordination and arc flash hazard analysis studies shall be summarized in a final report. No more than five (5) bound copies of the complete final report shall be submitted.
2. The report shall include the following sections:
 - i. One-line diagram showing protective device ampere ratings and associated designations, cable size & lengths, transformer kVA & voltage ratings, motor & generator kVA ratings, and switchgear/switchboard/panelboard designations
 - j. Descriptions, purpose, basis and scope of the study
 - k. Tabulations of the worst-case calculated short circuit duties as a percentage of the applied device rating (automatic transfer switches, circuit breakers, fuses, etc.); the short circuit duties shall be upward-adjusted for X/R ratios that are above the device design ratings
 - l. Protective device time versus current coordination curves with associated one line diagram identifying the plotted devices, tabulations of ANSI protective relay functions and adjustable circuit breaker trip unit settings
 - m. Fault study input data, case descriptions, and current calculations including a definition of terms and guide for interpretation of the computer printout
 - n. Incident energy and flash protection boundary calculations
 - o. Comments and recommendations for system improvements, where needed
 - p. Executive Summary including source of information and assumptions made

C. Qualifications

1. The short-circuit, protective device coordination and arc flash hazard analysis studies shall be conducted under the supervision and approval of a Registered Professional Electrical Engineer skilled in performing and interpreting the power system studies. The Registered Professional Electrical Engineer shall be a full-time employee of the electrical power equipment manufacturer (Square D, Eaton, GE/ABB or equal).

D. Studies

1. Contractor to furnish short-circuit and protective device coordination studies as prepared by equipment manufacturer. The coordination study shall begin with the utility company's feeder protective device and include all of the electrical protective devices down to and include the largest feeder circuit breaker and motor starter in the 480 Volt system. The study shall also include variable frequency drives, harmonic filters, power factor correction equipment, transformers and protective devices associated with variable frequency drives, emergency and standby generators associated paralleling equipment and distribution switchgear.
2. The contractor shall furnish an Arc Flash Hazard Analysis Study per NFPA 70E - Standard for Electrical Safety in the Workplace, reference Article 130.3 and Annex D.

E. Data Collection

1. Contractor shall furnish all field data as required by the power system studies. The Engineer performing the short-circuit, protective device coordination and arc flash hazard analysis studies shall furnish the Contractor with a listing of required data immediately after award of the contract.

F. Short-Circuit and Protective Device Evaluation Study

1. Use actual conductor impedances if known. If unknown, use typical conductor impedances based on IEEE Standards 141, latest edition.
2. Transformer design impedances and standard X/R ratios shall be used when test values are not available.
3. Provide the following:
 - a. Calculation methods and assumptions
 - b. Selected base per unit quantities
 - c. One-line diagram of the system being evaluated with available fault at each bus, and interrupting rating of devices noted
 - d. Source impedance data, including electric utility system and motor fault contribution characteristics
 - e. Typical calculations
 - f. Tabulations of calculated quantities
 - g. Results, conclusions, and recommendations
4. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault at each:
 - a. Electric utility's supply termination point
 - b. Enclosed breaker
 - c. 480V and 240V panelboards
 - d. Reduced voltage starters
 - e. Standby generators and automatic transfer switches
5. For grounded systems, provide a bolted line-to-ground fault current study for areas as defined for the three-phase bolted fault short-circuit study.
6. Protective Device Evaluation:
 - a. Evaluate equipment and protective devices and compare to short circuit ratings

G. Protective Device Coordination Study

1. Proposed protective device coordination time-current curves shall be graphically displayed on log-log scale paper.
2. Include on each curve sheet a complete title and one-line diagram with legend identifying the specific portion of the system covered.
3. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which device is exposed.
4. Identify device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.
5. Plot the following characteristics on the curve sheets, where applicable:
 - a. Electric utility's protective device

- b. Medium voltage equipment relays
 - c. Medium and low voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands
 - d. Low voltage equipment circuit breaker trip devices, including manufacturer's tolerance bands
 - e. Transformer full-load current, magnetizing inrush current, and ANSI transformer withstand parameters
 - f. Conductor damage curves
 - g. Ground fault protective devices, as applicable
 - h. Pertinent motor starting characteristics and motor damage points
 - i. Pertinent generator short-circuit decrement curve and generator damage point
6. Provide adequate time margins between device characteristics such that selective operation is provided, while providing proper protection.

H. Arc Flash Hazard Analysis

- 1. The arc flash hazard analysis shall be performed according to the IEEE 1584 equations that are presented in NFPA70E-2004, Annex D.
- 2. When appropriate, the short circuit calculations and the clearing times of the phase overcurrent devices will be retrieved from the short-circuit and coordination study model. Alternative methods shall be presented in the proposal.
- 3. The flash protection boundary and the incident energy shall be calculated at all significant locations in the electrical distribution system (enclosed breaker, pump control panel, wet well, junction box, generator and automatic transfer switch) where work could be performed on energized parts.
- 4. The Arc-Flash Hazard Analysis shall include all MV, 480V locations and significant locations in 240 volt and 208 volt systems fed from transformers equal to or greater than 125 kVA.
- 5. Safe working distances shall be specified for calculated fault locations based upon the calculated arc flash boundary considering an incident energy of 1.2 cal/cm².
- 6. The Arc Flash Hazard analysis shall include calculations for maximum and minimum contributions of fault current magnitude.
- 7. Arc Flash calculations shall be based on actual overcurrent protective device clearing time. Maximum clearing time will be capped at 2 seconds based on IEEE 1584-2002 section B.1.2.

I. Report Sections

- 1. Input Data
- 2. Short-Circuit Data
- 3. Recommended Protective Device Settings
 - a. Circuit Breakers:
- 4. Incident energy and flash protection boundary calculations.
 - a. Arcing fault magnitude

- b. Device clearing time
- c. Duration of arc
- d. Arc flash boundary
- e. Working distance
- f. Incident energy
- g. Hazard Risk Category
- h. Recommendations for arc flash energy reduction

J. Field Adjustment

- 1. Adjust relay and protective device settings according to the recommended settings table provided by the coordination study.
- 2. Make minor modifications to equipment as required to accomplish conformance with short circuit and protective device coordination studies.
- 3. Notify Owner in writing of any required major equipment modifications.

K. Arc Flash Warning Labels

- 1. The vendor shall provide a 3.5 in. x 5 in. thermal transfer type label of high adhesion polyester for each work location analyzed.
- 2. The label shall have an orange header with the wording, "WARNING, ARC FLASH HAZARD", and shall include the following information:
 - a. Location designation
 - b. Nominal voltage
 - c. Flash protection boundary
 - d. Hazard risk category
 - e. Incident energy
 - f. Working distance
 - g. Engineering report number, revision number and issue date
- 3. Labels shall be machine printed, with no field markings
- 4. Arc flash labels shall be provided in the following manner and all labels shall be based on recommended overcurrent device settings.
 - a. For each 480 and applicable 240 volt enclosed breaker and disconnects, one arc flash label shall be provided
 - b. For each reduced voltage starter, one arc flash label shall be provided
 - c. For each panelboard, one arc flash label shall be provided
- 5. Labels shall be field installed by the contractor.

16100 - BASIC MATERIALS

2.01 RACEWAYS

- A. The following specifications and standards are incorporated into and become a part of this specification:
 - 1. Underwriter's Laboratory, Inc. Publications 1, 6, 467, 651, 797, 1242.
 - 2. American National Standards Institute C-80.1, C-80.3.

- B. Raceway is required for all wiring, unless specifically indicated or specified otherwise. The minimum size of conduit shall be ¾" but shall not be less than size indicated on the drawings or required by the NEC.
- C. Conduits shall be provided for the following conditions:
 - 1. Conduits above grade shall be aluminum rigid conduit (ARC).
 - 2. Conduits installed within concrete slabs shall be schedule 80 heavy wall PVC. Where transition is made from raceway in slab to any type of raceway out of slab, make transition with an ARC
 - 3. Conduits installed in direct contact with earth shall be schedule 80, heavy wall PVC.
 - 4. Conduits, fittings, outlet boxes, etc. in chemical rooms shall be schedule 80 PVC.
- D. ARC fittings shall be standard threaded couplings, threaded hubs, bushings, and elbows. All ARC fittings shall be aluminum alloy; set screw or non-threaded fittings are not permitted. Non-metallic conduit fittings shall be of the same material as the conduit furnished and shall be the product of the same manufacturer.
- E. All conduit support parts and hardware shall be stainless steel. Conduit clamps shall be two piece 316 stainless steel type. Conduit support channels shall be 1-5/8" x 1-5/8" - 14 gauge channel. Wire or chain is not acceptable for conduit hangers. Individual conduit hangers shall be stainless steel specifically designed for the purpose.
- F. Leave all empty conduits with a 200 lb. test nylon cord pull line. Complete raceway runs prior to installation of wires or cables. Deformed conduits shall be replaced. Protect conduits against dirt, plaster, and foreign debris with conduit plugs.
- G. Fasten conduit support devices to structure with toggle bolts on hollow masonry, expansion anchors on solid masonry or concrete, and machine bolts or clamps on steel. Nails are not acceptable.
- H. Conduit shall be run parallel or at right angles to walls, ceilings, and structural members. Support branch circuit conduits at intervals not exceeding 10 feet, and within 3 feet of each box or change of direction.
- I. All conduits entering or exiting concrete or installed below grade shall be protected from corrosion.
 - 1. Metallic conduits shall be protected from corrosion as follows:
 - a. Apply two coats of 3M Scotchrap pipe primer. Allow the primer to dry before application of the second coat or application of tape.
 - b. Apply two overlapping layers of 3M Scotchrap 51 tape.
 - c. Pipe primer and tape shall extend from the end of the metallic conduit to 6" above grade or concrete.

- J. All conduits entering electrical equipment from below grade shall be sealed with electrical putty.
- K. Conduit terminations to enclosures shall utilize threaded hubs.
- L. Conduits in chemical rooms shall be sealed with electrical putty at all terminations, outlets, fixtures, etc.

2.02 WIRES AND CABLES

- A. The following specifications and standards are incorporated into and become a part of this specification:
 - 1. Underwriter's Laboratories, Inc. Publications 44, 83, 486, 493.
 - 2. Insulated Cable Engineers Association Standards S-61-402, S-66-524.
 - 3. National Electrical Manufacturer's Standards WC-5, WC-7.
- B. Conductors shall be electrically continuous and free from short circuits or grounds.
- C. All open, shorted, or grounded conductors and any with damaged insulation shall be removed and replaced with new material free from defects.
- D. Conductor size shall be minimum of No. 12 AWG, unless larger size is required by the drawings or the NEC. Insulation voltage level rating shall be 600 volts. All wire and cable shall bear the UL label. Data, and communication conductors are not included in this specification; they shall comply with NEC requirements.
- E. Conductors No. 10 and smaller shall be solid copper, 90 degrees C. type THWN/THHN. Conductors larger than No. 10 shall be stranded copper, 90 degrees C. type THWN/THHN, or XHHW.
- F. Color code all conductors. No. 6 and smaller shall have solid color compound or coating. No. 4 and larger shall have solid color compound or colored phase tape; tape shall be installed on conductors in every box, termination point, cabinet, or enclosure. Coding shall be as follows:

Voltage	Phase A	Phase B	Phase C	Neutral
240/120V, 1 Phase, 3 Wire	Black	Red	---	White
208Y/120V, 3 Phase, 4 Wire	Black	Red	Blue	White
480Y/277V, 3 Phase, 4 Wire	Brown	Orange	Yellow	Gray

- G. Maintain phase rotation established per N.E.C. at service equipment throughout entire project.
- H. Group and lace with nylon tie straps all conductors within enclosures. Make splices in conductors only within junction boxes, wiring troughs, or other NEC approved enclosures. Do not splice conductors in pull boxes, switchboards, panelboards, safety switches, or motor control enclosures. Identify each conductor as to circuit connection in all boxes and enclosures.
- I. Terminate stranded conductors No. 10 AWG and smaller with crimp-type lug or stud. Crimp terminal shall be the configuration type suitable for terminal point.
- J. Torque each terminal connection to the manufacturer's recommended torque value. A calibrated torquing tool shall be used to insure proper torque application.

2.03 BOXES

- A. The following specifications and standards are incorporated into and become a part of this specification:
 - 1. Underwriter's Laboratories, Inc. Publications 50, 467, 514.
- B. Boxes shall be hot-dipped galvanized steel sheet metal unless rustproof cast metal is specified or required by the NEC. Boxes for surface and pendant mounted lighting fixtures shall be 4" octagon boxes, 1 1/2" deep. Switches, receptacles, and wall mounted junction boxes shall be 4" square boxes, 1 1/2" deep; where only one conduit enters box, 3 1/2" deep single gang switch box may be used for wall mounted devices. Outlet boxes for GFI receptacles shall be 2 3/4" deep.
- C. Outlet boxes for switches and receptacles in exposed wiring systems shall be cast FS type with matching device plate. For exterior installations, use extra duty in-use hinged covers. Boxes for individual devices flush mounted in exposed concrete block shall be single gang masonry boxes 3 1/2" deep. Provide larger boxes as required for special purpose devices.
- D. Dimensions of pull and junction boxes shall not be less than those required by the NEC for the number, size, and position of conductors entering the box. Wood supports within pull boxes are not acceptable. Provide box covers for all boxes.
- E. All boxes shall be completely accessible and as required by the NEC. Provide access panels in all non-accessible spaces to permit access to boxes. Provide an outlet box for each lighting fixture or as indicated on the drawings and for each device. Box sizes shall be increased from those outlined above if required by Article 314 of the NEC.
- F. Support every box from structure. Secure to wood with wood screws, hollow masonry with toggle bolts, metal with sheet metal screws, solid masonry or concrete

with expansion anchors, metal studs with spring steel clamp, and structure with threaded steel rod when suspended. Set outlet boxes for flush mounted devices to within 1/8" of finished walls; spacers or shims between box and device are not acceptable. Support outlet boxes for support of surface mounted incandescent lighting fixtures by light weight channel spanning between and mounted to main ceiling support member, attached by galvanized tie wire or nylon tie straps.

- G. Remove only knockouts as required and plug all unused openings. After completion, using indelible ink wide tip marker, indicate on the cover of each junction and pull box the designation of each circuit contained therein.

2.04 WIRING DEVICES

- A. The following specifications and standards are incorporated into and become a part of this specification:
 - 1. National Electrical Manufacturer's Association Publications WD-1, WD-5.
- B. Single pole, 20 amp, 277 volt toggle switches shall be Hubbell 1221. Weatherproof, 20 amp, 277 volt switches shall be Hubbell 1281-1750. Equivalent switches manufactured by Arrow Hart, Legrand, or Leviton are acceptable.
- C. Fifteen amp, 125 volt grounded duplex receptacles (NEMA 5-15R) shall be Hubbell 5252. Twenty amp, 125 volt grounded duplex receptacles (NEMA 5-20R) shall be Hubbell 5352. Ground fault interrupter (GFI) receptacles shall be Hubbell GFWRST20W. Equivalent receptacles manufactured by Arrow Hart, Legrand, or Leviton are acceptable.
- D. Device plates shall be one piece single or multi-gang type selected to match the device or combination of devices. Device plates for flush mounted devices shall be type 302 stainless steel. Device plates for use with devices flush mounted in exposed masonry construction shall be jumbo type. All devices installed in areas exposed to the weather shall be provided with a weatherproof device plate.
- E. All devices shall be provided with white finish. Mount all devices within outlet boxes to allow device plates to be in contact with wall on all sides. Install wall switches on the strike side of doors.

2.05 CIRCUIT AND MOTOR DISCONNECTS

- A. The following specifications and standards are incorporated into and become a part of this specification:
 - 1. Underwriter's Laboratories, Inc. Publications 98, 198.2, 198.4.
 - 2. National Electrical Manufacturer's Association Publications KS-1.
- B. Products of GE/ABB, Eaton, or Square D which comply with these specifications are acceptable.

- C. Disconnect switches shall be heavy duty non-fusible safety switch type, unless fused type is indicated on the drawings, with the number of poles required to disconnect all ungrounded conductors serving the equipment.
 - 1. Furnish a solid neutral when the circuit includes a neutral conductor.
 - 2. Furnish an equipment grounding conductor lug bonded to the switch enclosure.
 - 3. Furnish NEMA type one enclosure for all interior dry locations, and NEMA type 3R for all damp, wet, or exterior locations unless other types are indicated on the drawings.
 - 4. Switches for air conditioning equipment shall be fused if required by the equipment manufacturer. Fuse size shall be as shown on the equipment nameplate.
 - 5. Furnish with break-first/make-last auxiliary contacts on operator shaft where specified.
- D. Switches shall have the following features:
 - 1. Quick-make, quick break switching mechanism.
 - 2. Line terminal shields.
 - 3. Provisions for padlocking in the "off" position.
 - 4. Door interlocks to prevent door from opening when switch is closed. Provide inconspicuous means to defeat this interlock.
 - 5. Permanent name plate indicating all ratings.
 - 6. Arc chute for each pole.
 - 7. 600 volt rating for 250 to 600 volt systems, 250 volt rating for systems below 250 volts.
 - 8. Rejection clips to accept only RK1 or RK5 fuses when switch is fusible type.
- E. Disconnect switches for three phase motors rated two horsepower and above shall be three pole non-fusible type. Disconnect switches for three phase motors rated less than two horsepower shall be three pole manual motor starter switches without overload protection. Disconnects for single phase motors shall be single or two pole horsepower rated switches without overload protection.
- F. Locate switches to provide full accessibility and working clearances required by the NEC. Locate adjacent to equipment served unless drawings indicate otherwise. Mount switch directly to structure or to metal channel depending upon field conditions. Mount switch handle between 36" and 60" above finished floor.

2.06 FULL VOLTAGE / NON-REVERSING (FVNR) MAGNETIC STARTERS

- A. Magnetic starters shall be across-the-line non-combination type, unless noted otherwise.
- B. Magnetic starters shall be NEMA size one unless other size is shown on the drawings or unless larger size is required by actual motor controlled. Mount starters within the pump control panel, unless noted otherwise.. Starters shall be for operation on a three-phase 460-volt, 230V or 208V, as applicable, system.

- C. Each magnetic starter shall have solid state overload protection. Control voltage shall be 120 volts provided from a separate source. Provide fuse for control coil. Provide hand-off-automatic switch. Interlocks shall be provided to provide control sequence indicated on the drawings.
- D. Provide Square D type S contactors and Square D Class 9065 Motor Logic solid state overload relays.
- E. Combination type starters shall be furnished with a control power transformer with fuse protection, H-O-A switch, and a NEMA 4X fiberglass enclosure.

2.07 REDUCED VOLTAGE SOLID STATE STARTER

- A. Quality Assurance
 - 1. The soft start shall be listed by an independent testing laboratory in accordance with Electric Industrial Control Equipment Specification UL508.
 - 2. The soft start shall carry the CE mark for indication of compliance to low voltage and EMC directives.
 - 3. The manufacturer shall be a certified ISO 9002 facility.
- B. Warranty
 - 1. An eighteen-month warranty shall be provided on materials and workmanship from date of invoice.
- C. General Description
 - 1. The soft starter shall be provided by the manufacturer in an enclosure rated as NEMA 4X stainless steel for industrial use when mounted separately.
 - a. Enclosure shall include a door mounted digital keypad for adjusting the soft start parameters and viewing the motor, soft start and fault status without opening the enclosure door.
 - b. Provisions shall be available for padlocking the enclosure door.
 - 2. The enclosed product shall be provided complete with one of the following overcurrent protective devices (OCPDs) for Type 1 short circuit protection:
 - a. Molded case disconnect switch and in-line fuse block for RK Type power fuses from 10 to 600 A or Class L power fuses from 601 to 1600 A. Short circuit withstand rating shall be 65KArms.
 - 3. The motor must be automatically protected from solid state component failure by one of the following means:
 - a. Shunt trip coil to trip disconnect in the event of a controller fault condition including a shorted thyristor.
 - 4. The soft start shall utilize a thyristor (SCR) bridge consisting of at least two SCRs per phase to control the starting and stopping of industry standard motors.
 - 5. The soft start shall provide torque control for linear acceleration without external feedback independent of motor load or type of application. The gating

of the thyristors will be controlled in such a manner to ensure smooth and stable acceleration ramp.

6. The soft start shall be controlled by a microprocessor that continuously monitors the current and controls the phasing of the SCRs.
7. A shorting contactor shall be supplied with soft starts rated 47 A or above in Type 1 enclosures. Protective features and deceleration control options integral to the soft start shall be available even when the shorting contactor is employed.

D. Ratings

1. The soft start shall be designed to operate in an ambient temperature 0 deg C to 40 deg C. For ambient temperatures between 40 deg C and 60 deg C, derate the current by 1.2% per deg C above 40 deg C.
2. Maximum relative humidity shall be 93% at 40 deg C, non-condensing.
3. The soft start shall be capable of operation between -15% and +10% of nominal voltage rating.
4. Frequency tolerance shall be 5% when starting and between +5% and -15% during steady state operation.
5. The soft start shall be capable of supplying 300% of rated full load current for 30 seconds at maximum ambient temperature.
6. The SCRs shall have a minimum P.I.V. rating of 1400 Vac. Lower rated SCRs with protection by MOVs are not acceptable.

E. Adjustments and Configurations

1. All dialogue functions, display units, remote functions, terminal blocks, configuration switches and adjustment potentiometers shall be accessible on the front of the control module.
2. Digital indication shall provide, as a minimum, the following conditions:
 - a. Soft start status - ready, starting/stopping, run.
 - b. Motor status - current, torque, thermal state, power factor.
 - c. Fault status - Motor thermal overload, starter thermal fault, phase fault, frequency fault, supply fault, locked rotor fault, motor underload, max start time exceeded, external fault, serial link fault, phase inversion, internal failure, overcurrent.
3. The starter must be preset to the following for adjustment-free operation in most applications:
 - a. Torque acceleration ramp of 10 seconds.
 - b. Current limitation to 300% of the motor full load current rating.
 - c. Class 10 overload protection.
 - d. Motor current preset per NEC and UL tables for standard hp motors.
4. A digital keypad shall be utilized to configure the following operating parameters as required:
 - a. Motor full load amps adjustable from 50 to 130% of the controller's rating.
 - b. Current limitation on starting adjustable from 1.5 to 7 times rated motor current.
 - c. Torque ramp adjustable from 1 to 60 seconds.

- d. Initial torque adjustable from 10 to 100% of nominal motor torque.
 - e. Torque limit adjustable from 10 to 200% of nominal motor torque.
 - f. Maximum start time adjustable from 10 to 999 seconds.
 - g. Voltage boost adjustable from 50 to 100% of the nominal supply voltage.
 - h. Selection of freewheel, soft stop or braking.
 - i. Adjustable soft stop torque ramp time from 1 to 60 seconds.
 - j. Threshold to change to freewheel following a soft stop from 0 to 100% of the nominal motor torque.
 - k. Selection of Class 2, 10, 10A, 15, 20, 25 or 30 motor thermal overload protection.
5. A digital keypad shall be utilized to configure the following controller parameters as required:
 - a. Selectable automatic reset operation.
 - b. Cancellation of the torque control loop for multi-motor installations.
 - c. Adjustment of the stator loss estimation for specialty motors.
 - d. Assignment of controller inputs and outputs.
 - e. Activation of phase reversal protection.
 - f. Reset of motor thermal state.
 - g. Return to factory settings.
 - h. Activation of test mode for use with low power motors.
 - i. Indication of elapsed time in hours of starting, running and stopping.
 6. Output relays shall provide the following status indications:
 - a. One form A and one form B minimum for indication of fault or control of an isolation contactor.
 - b. One form A for indication that torque ramp is complete and current is below 130% motor FLA (End of start).
 7. Additional inputs and outputs shall be available to provide the following status indications:
 - a. One logic input for force to freewheel, indication of external fault, force to local control, control of cascading motors, or external motor overload reset.
 - b. One logic output for indication of motor thermal overload pre-alarm or presence of motor current and one logic output to indicate overcurrent alarm.
 - c. One analog output shall be available for 4 to 20 or 4 to 20 milliamp indication of motor current, torque, thermal state, or power factor.
 8. Relay and I/O functions listed above must be isolated with respect to common.

F. Protection

1. A microprocessor controlled thermal protection system shall be included which continuously calculates the temperature-rise of the motor and soft start and provides:
 - a. An overload pre-alarm which indicates by relay contact that the motor has exceeded its rated temperature rise by 110%. This function shall be annunciation only.

- b. A thermal fault condition which stops the motor if the temperature-rise exceeds 120% of the motor thermal capability.
 - c. An analog electronic circuit with a time-constant adjustable to the motor's thermal cooling time-constant ensuring the memorization of the thermal state even after power supply disconnection or shorting out of the power semiconductors.
 - 2. The soft start shall provide phase loss, phase reversal, underload, stall, and jam protection.
 - 3. The integral protective features shall be active even if an external shorting contactor is used to bypass the SCRs during steady state operation.
- G. Control Options
- 1. The soft start's control circuit shall be fed from the line supply and be completely independent of the power circuit and separate from the control logic.
 - 2. The peripheral soft start control circuitry shall be operated at 120 Vac 60 Hz from a control power transformer included within the enclosure.
 - 3. Operator devices shall be door mounted and shall be (choose all that apply:)
- H. Shorting Contactor (Standard on Soft Starts 47A and above)
- 1. A microprocessor shall control the operation of the shorting contactor via an output relay.
 - 2. The shorting contactor shall close, shorting the thyristors after the motor current is below 130% of motor FLA and voltage is below nominal voltage (indicating ramp complete), and open on a stop command to allow a deceleration ramp.
 - 3. Overload protection integral to the soft start shall continue to protect the motor when shorting is utilized.
- I. Control power shall be 120 volts AC from the pump control panel. The electronic control shall contain pilot lamps to indicate the following:
- 1. Control Power On
 - 2. Trip Condition Due to Load Unbalance.
 - 3. Trip Condition Due to Overload or Locked Rotor
- J. An oil-tight pilot lamp indicating motor running shall be mounted on the compartment door.
- K. Reduced voltage starter shall be mounted in the pump control.
- L. Provide Altistart 48 by Square D or equivalent by Eaton, GE/ABB or Danfoss.
- M. Document all settings with record drawings.

2.08 SUPPORTING DEVICES

- A. Provide and install supporting devices which comply with manufacturer's standard materials, design, and construction in accordance with published standards and as required for complete installation.

- B. Coordinate with other electrical work, including raceway and wiring work, as necessary to interface installation of supporting devices. Install hangars, supports, clamps, and attachments to support piping properly from building structure only.

2.09 ELECTRICAL IDENTIFICATION

- A. Install engraved plastic - laminate sign on each major unit of electrical equipment. Provide a single line of text, 1/2" high lettering on 1 1/2" high sign (or 2" high sign if 2 lines required). Provide signs for each unit of the following:
 - 1. Enclosed Breakers
 - 2. Automatic Transfer Switches
 - 3. Panelboards
 - 4. Electrical Cabinets and Enclosures
 - 5. Motor Controllers
 - 6. Disconnect Switches
 - 7. SCADA Cabinet
 - 8. Pump Control Panel
 - 9. Wet Well Junction Boxes

16400 - DISTRIBUTION EQUIPMENT

3.01 GROUNDING SYSTEMS

- A. Equipment grounding system shall be established with equipment ground conductors. The use of metallic raceways for equipment grounding is not acceptable. Unless indicated otherwise, provide equipment ground the same size as phase conductors.
- B. The following specifications and standards are incorporated into and become a part of this specification:
 - 1. Underwriter's Laboratories, Inc. Publications 44, 83, 467, 486, 493.
 - 2. National Electrical Manufacturer's Association Standards WC-5, WC-7.
- C. Grounding electrode conductors shall be bare or green insulated copper sized as indicated on the drawings. Equipment grounding conductors shall be green insulated type THW, THWN, or XHHW sized as indicated on the drawings. Where sizes are not indicated, grounding conductor shall be sized in accordance with NEC Article 250.
- D. Each receptacle and switch device shall be furnished with a grounding screw connected to the metallic device frame. Provide a conductor termination grounding lug bonded to the enclosure of each enclosed breaker.
- E. Ground all non-current carrying parts of the electrical system, i.e., wireways, equipment enclosures and frames, junction boxes, machine frames, and other

conductive items in close proximity with electrical circuits. Grounding connections to structural steel shall be made with a chemical exothermic weld.

- F. Grounding conductors for branch circuits are not shown on the drawings; however, grounding conductors shall be provided in all branch circuit raceways and cables, including flexible conduit. Grounding conductors shall be the same AWG size as branch circuit conductors.
- G. The equipment grounding conductor shall be terminated with a screw or bolt used for no other purpose. Equipment grounding conductors shall terminate on panel board, switchboard, or motor control center grounding bus only. Do not terminate on neutral bus.

3.02 TRANSFORMERS

- H. The following specifications and standards are incorporated into and become a part of this specification:
 - 1. Underwriter's Laboratories, Inc. Publications 506.
 - 2. National Electrical Manufacturer's Association Publication ST-20.
 - 3. American National Standards Institute Publications C-57, C-89.2.
- I. Products of GE/ABB, Eaton or Square D which comply with these specifications are acceptable.
- J. Transformers shall be self-cooled, rated for continuous operation at rated KVA, 24 hours per day, 365 days per year with normal life expectancy. Transformers shall be rated for average temperature rise by resistance of 150 degrees C. in 40 degrees C. maximum ambient, 30 degrees C. average ambient unless otherwise indicated. Transformer insulation system shall be UL rated as 220 degrees C. system. Sound rating shall not exceed NEMA and ANSI standards for the KVA rating. Internal vibration dampening shall be provided on all transformers.
- K. Transformer enclosures shall be open, ventilated, drip-proof with removable front and rear cover panels, suitable for floor mounting, for transformers rated 30 KVA and up. For transformers up to 25 KVA, transformers shall be totally enclosed, non-ventilated with a resin encapsulated core and coil and drip-proof housing.
- L. Primary ratings shall be 480 volts, 1 phase, 2 wire. Secondary service shall be 240/120 volts, 1 phase, 3 wire. Nominal impedance shall be 4.5 percent minimum.
- M. Core assemblies and the center ground connection point of the coil secondaries shall be grounded to their enclosures by adequate, flexible ground straps. Provide grounding lug at the strap to enclosure bonding location for connection of three conductors.

- N. Dry type transformers larger than 15 kva shall be floor mounted; 15 KVA and below shall be wall mounted. Installation shall meet the requirements of the N.E.C. Article 450. Transformers shall be mounted on neoprene, waffle type vibration pads 5/8" thick minimum. Primary and secondary connections shall be made with flexible conduit. The secondary windings of each transformer shall be grounded in accordance with the NEC requirements for separately derived systems.
- O. Do not install equipment over transformers, unless indicated on the drawings. Install secondary over current protective device within 10 feet horizontally from the transformer. Where none is indicated on the plans, provide an enclosed circuit breaker within 10 feet rated 125 percent of the transformer full load ampacity but not greater than the secondary conductor ampacity. Provide full working clearances as required by the NEC.

3.03 SURGE PROTECTION

- A. Surge protection for the system shall be a Square D XDSE series 150ka per phase, rated Type 2 surge protection device.
- B. The surge protection device shall be U.L. 1449, 4th ed listed. It shall have status indicating LED, diagnostic monitoring, an audible alarm and form C dry contacts.
- C. Provide manufacturers product data and connection diagrams.
- D. Enclosure shall be NEMA 4X.
- E. Mount where indicated on the drawings.
- F. Equal by Eaton, GE/ABB, Ditek or Intermatic is acceptable.

3.04 ENCLOSED BREAKERS

- A. The following specifications and standards are incorporated into and become a part of this specification:
 1. Underwriter's Laboratories, Inc. Publications 50, 67,489.
 2. National Electrical Manufacturer's Association Publications PB-1, AB-3.
- B. Products of GE/ABB, Eaton or Square D which comply with these specifications are acceptable.
- C. All circuit breakers shall be UL listed and bear a UL label. Where enclosed breakers serve as service entrance equipment, breaker assembly shall bear a UL label indicating such. Enclosed shall be of the dead front safety type.
- D. Breaker lugs shall be UL approved for copper or aluminum conductors and shall be of a size range for the conductors indicated on the drawings. Each enclosed breaker shall contain mechanical lugs for each conductor and, when required, a full size

insulated neutral. The neutral and ground busses shall have a sufficient number of lugs to singularly terminate each individual conductor requiring a connection. Provide bonding jumper sized per NEC Table 250.102(CXZ).

- E. Provide gutters and bending space to conform with the NEC. Key all enclosures throughout the project alike.
- F. Circuit breakers shall be quick-make, quick-break, thermal magnetic type. Multi-pole breakers shall be common trip and common reset type; tie handle connections are not acceptable. Interrupting ratings on 240 volt systems shall be 10,000 RMS symmetrical amps minimum; provide higher ratings when indicated on the drawings.
- G. Provide bonding jumper sized per NEC Table 250.102(C)(1).
- H. Mount enclosed breakers with operating handle not more than 6'-6" above finished floor. Enclosures shall be secured by a minimum of four fastening devices. Attach enclosure directly to masonry or concrete, maintaining a 1" rear clearance. Mount enclosure to metal channel for installations on steel structure or masonry.

3.05 PANELBOARDS

- A. The following specifications and standards are incorporated into and become a part of this specification:
 - 1. Underwriter's Laboratories, Inc. Publications 50, 67,489.
 - 2. National Electrical Manufacturer's Association Publications PB-1, AB-3.
- B. Products of GE/ABB, Eaton, or Square D which comply with these specifications are acceptable.
- C. All panels and circuit breakers shall be UL listed and bear a UL label. Panels shall be of the dead front safety type. Provide panels complete with factory assembled circuit breakers connected to the bus bars. Number all panelboards in the following sequence: Circuits 1 and 2 - Phase A; circuits 3 and 4 - Phase B; circuits 5 and 6 - Phase C.
- D. All bus bars shall be copper. Main lugs and main breaker shall be UL approved for copper or aluminum conductors and shall be of a size range for the conductors indicated on the drawings. Each panel shall contain a full size grounding bus and, when required, a full size insulated neutral bus. The neutral and ground busses shall have a sufficient number of lugs to singularly terminate each individual conductor requiring a connection. The ground bus shall be brazed or riveted to the panel enclosure, but not attached to the panel interior. Where designated, each "space" shall include all bussing, device supports and connections for future breaker installation. Where indicated, provide sub-feed or through-feed lugs and increase

box height to provide additional cable bending space; lug size shall match ampacity of mains.

- E. Branch circuit panel board width shall be between 20 and 22 inches; depth shall be 5 3/4" maximum. Distribution panel board width shall be 32" minimum and depth shall be 14" maximum. Provide gutters and bending space to conform with the NEC. Key all panels throughout the project alike.
- F. Circuit breakers shall be quick-make, quick-break, thermal magnetic type bolted to the bus. Multi-pole breakers shall be common trip and common reset type; tie handle connections are not acceptable. Interrupting ratings on 240 volt systems shall be 10,000 RMS symmetrical amps minimum and on 480 volt systems shall be 18000 RMS symmetrical amps minimum; provide higher ratings when indicated on the drawings. Provide the following when specified, indicated on the drawings, or required by the NEC:
 - 1. Ground fault interrupting circuit breaker (GFI).
 - 2. NEMA 4X Stainless Steel enclosure
- G. Mount panel boards with top circuit not more than 6'-6" above finished floor. Enclosures shall be secured by a minimum of four fastening devices. Attach enclosure directly to masonry, concrete, or wood, maintaining a 1" rear clearance. Mount enclosure to metal channel for installations on steel structure or drywall.
- H. Provide in each panel board a typewritten circuit directory mounted under clear plastic in metal holder in the door of the panel reflecting all field changes additions. Install push-in knock-out closure plugs in any unused knock-out openings.

3.06 PUMPING STATION DUPLEX CONTROL PANEL

- A. Furnish and install one duplex control panel housed in a NEMA 4X stainless steel enclosure with door-within-door construction for operation on the system identified on the electrical drawings.
- B. For each pump motor there shall be included an individual motor circuit breaker, motor controller, manual reset, hand-off-auto selector switch, green running light and elapsed time meter and amp meter for Phase B. Provide door mounted pilot lamps for a high level alarm and phase failure/under voltage alarm. Provide alarm light mounted as shown on drawings. Provide 20 amp single pole breakers in control panel to serve auxiliary loads shown on the drawings. Provide phase failure/under voltage relay to deenergize motors and to provide signal alarm to SCADA. All components shall be NEMA rated.
- C. Units shall be precalibrated to match motors and control characteristics and factory sealed to ensure trip setting is tamperproof. A 24 volt control circuit transformer with disconnect and overload protection shall be included with an automatic electrical alternator for use with the level sensor function.

- D. Note that only the 24 volt control voltage shall be used in the wet well sensor circuits. The remainder of the controls shall be designed to operate on 120 volt, 60 hertz, single phase. The complete unit shall be completely tested and inspected at the factory prior to shipment. Complete electrical diagrams, dimensional drawings, and functional description shall be provided for approval by the Engineer.
- E. Provide the following sequence of operation and components:
1. Pump Control Panel
 - a. The control panel shall have a NEMA 4X stainless steel enclosure with a 3-point latch that maintains the 4X rating of the enclosure. Furnish the panel outer door with a stainless steel door stop kit.
 - b. The control panel enclosure shall be furnished with a white polyester powder coat finish.
 - c. The control panel shall have an inner dead-front polished aluminum door.
 1. Display indication lights, control switches, internal duplex receptacle and hour meters shall be mounted in the inner door.
 2. The circuit breakers for the pumps, transformer, surge protector and other branch circuit shall be mounted on stand-off brackets and be flush with inner door.
 3. The inner door shall be secured with a minimum of two quarter turn latches.
 4. The inner door shall be furnished with a door stop kit.
 - d. The control panel shall have power distribution blocks, thermal magnetic circuit breakers for pump motors, surge protection, transformer and branch circuits.
 - e. Separate feeder breakers shall be provided for the following loads:
 1. Surge protection device; sized per the manufacturer's recommendations
 2. Pump No.1, Pump No. 2; sized per the NEC
 3. Wet Well Wizard; sized per the manufacturer's recommendations and the NEC
 - f. Separate branch circuit breakers shall be provided for the following loads:
 1. Panel controls
 2. Level control system (HydroRanger 200).
 3. SCADA system
 4. Area light
 5. GFCI receptacle in the control panel
 6. Generator coolant heater
 7. Generator battery charger and auxiliary loads
 8. Spare
 - g. The primary level control system shall be a Siemens HydroRanger 200 HMI ultrasonic level controller with an XPS-15 ultrasonic transducer. Equivalent products of ISCO are acceptable.
 1. The HydroRanger shall be mounted in the pump control panel, on stand-off supports, such that the front of the controller is flush with the inner door.

2. The ultrasonic transducer cable shall be continuous, without splices, connection, or terminal strips, from the controller to the wet well.
 3. The backup level control shall be a two-float system.
 - h. High Level: Progressively starts the pumps with a 30 second delay between Lead and Lag; initiates an alarm to SCADA.
 - i. Low level: Stops all pumps and resets the system.
 - j. The pump controls shall prevent both pumps from starting at the same time, under any condition, but especially upon restoration of power to the control panel. The time delay between permitted pup starts shall be adjustable: 5 seconds to 5 minutes.
 - k. A High-Level alarm shall annunciate both High Level and Primary Level Control System Failure to SCADA. The station alarm light and horn shall be activated by this alarm condition.
 - l. The control panel shall be provided with a weatherproof audible alarm silence button mounted on the panel exterior.
 - m. The control panel shall be provided with a terminal strip for connection of all alarm and control conductors between:
 1. The control panel and the ATS
 2. The control panel and SCADA
 3. Each terminal pair shall be labeled.
 4. Refer to the detail drawing E-1 for a list of required telemetry points.
2. Control Requirements: Control operations shall be as follows:
- a. Start and stop pumps at required water levels in the wet well.
 - b. Alternate the sequence of starting (and stopping) between two pumps to equalize run time and record run time.
 - c. Progressively start the second pump if water level continues to rise above a predetermined level (Engineer to provide field elevation data).
 - d. Provide an alarm light and signal connection for abnormal conditions: High water level and phase failure/under voltage (Engineer to provide elevations), pump overload trip or other pump abnormal shutdown.
 - e. Display of operating conditions.
 - f. Provide controls so all pumps do not operate 1 minute after transfer to emergency or to normal power. Set controls so only one pump can start at one time.
3. Components:
- a. Enclosure: The controls shall be mounted in a NEMA 4X stainless steel. All control devices shall be mounted in inner door. Motor circuit breakers and motor controllers shall be NEMA rated.
 - b. Two Pump Alternator
 - c. Elapsed Time Meters: Per pump required - door mounted.
 - d. Hand-off-Auto Switch per pump - door mounted.
 - e. High level pilot lamp - door mounted.
 - f. Phase failure/under voltage pilot lamp - door mounted.

- g. AMP Meter-B Phase-Door Mounted.
- h. Motor controller for each pump provided
- i. Motor Circuit breaker for each pump provided.
- j. Protective relays and auxiliary relays. Relays shall be 8 or 11 pin round.
- k. Terminals blocks for all connections.
- l. Vaportight and waterproof alarm light with wire guard mounted as shown on drawings.

16700 COMMUNICATIONS SYSTEMS

4.01 SCADA SYSTEM

- A. The SCADA system shall be a Distributed Remote Access Control System – Remote Terminal Unit (DRACS-RTU).
- B. The preferred vendor for this system is by Lord & Company, Inc. of 2100 Carolina Place Drive; Fort Mill, South Carolina 29708. For standardization purposes no other products will be considered.
- C. The Contractor shall furnish and install a DRACS-RTU with all accessories, and appurtenances at the well and as shown on the contract drawings.
 - 1. All testing and certification shall be by the SCADA vendor.
 - 2. At project completion, the Contractor and SCADA vendor shall demonstrate satisfactory operation of the system, including all modifications to the owner’s graphic screens for the well.
- D. DRACS-RTU systems shall include the RTU hardware and the required RTU programming and SCADA System HMI software configuration for the application. This includes HMI driver, I/O database, and graphic screens to match the owner’s existing graphic screens to include trends, alarms, alarm notifications, etc. The graphics platform/program shall be VT SCADA by Trihedral, no exceptions.
- E. Each DRACS-RTU shall be furnished with the following features:
 - 1. NEMA 4X 304 stainless steel enclosure.
 - 2. Reliable non-proprietary industrial grade components that are readily available from local distributors.
 - 3. Allen Bradley Micro 800 series CPU onboard for distributed control of the pump station.
 - 4. The SCADA panel at the operator’s office shall utilize an Allen-Bradley CompactLogix CPU for overall control of the total SCADA system.
 - 5. Low power consumption energy efficient with battery backup for a minimum of 24 hours of operation on battery.
 - 6. Standard off the shelf batteries.
 - 7. Battery shelf with strap to secure batteries.
 - 8. Communication ports Ethernet 10/100 Mbps / RS-232 / RS485
 - 9. SCADA communications via 4G cellular modem. The system shall be upgradable to 5G in the future.

10. Smartphone / tablet approved remote access view.
 11. RTU 120 VAC loss of power alarm
 12. Standard non-proprietary I/O modules.
 13. Manufactured in the USA.
 14. RTU intrusion alarm.
 15. Expanding capabilities for additional future I/O.
 16. Automatic switchover to battery on power fail
 17. Full size DIN rail mounted terminal blocks for easy field wiring terminations.
 18. UL-508A industrial control panel certification.
 19. Surge protection built-in (120 VAC incoming power)
- F. The DRACS-RTU shall have standard inputs and outputs of the following:
1. 20 Digital Inputs (Dry Contact Inputs)
 2. 12 Digital Outputs (Relay Dry Contact Outputs)
 3. 4 Analog Inputs (4-20 mA DC)
 4. 2 Analog Outputs (0 – 10 VDC)
- G. The DRACS-RTU I/O shall have expandable inputs and outputs of the following:
1. 4 Analog Inputs (4-20 mA DC)
 2. 4 Analog Outputs (4-20mA DC)
- H. The communications connection shall be via Ethernet and protocol will be the open non-proprietary DNP3. The protocol shall have the following features at a minimum with no exceptions:
1. True open & non-proprietary protocol
 2. Classification of field data, real time and time stamped event data. Four different classes of data, 0,1,2,3. Each class of data shall be independent from the other. A class of data will have variation parameters which allow the user to select the type of value, time, and diagnostic information to be recorded.
 3. Report by exception unsolicited reporting or polled, user selectable
 4. Time-stamped data allowing for event data to be logged in the PLC and uploaded during the next successful communication with the system.
 5. Support for time synchronization
 6. Secure authentication
 7. Diagnostic information for each I/O point
 8. Communication to multiple masters
 9. Interoperability between multi-vendor devices
- I. Each DRACS-RTU shall allow remote access view with the SCADA System to include mobile phones, tablet and laptops with the proper login and password.
- J. The DRACS-RTU shall provide interface with the well motor controller (RVSS) and generator with a standard program for well control. Provide minimum run time when well is called to run and a minimum time delay to next start.

- K. The DRACS-RTU shall provide pump controls for interface to the generator/automatic transfer switch for programmed startup of the pump station when switching to emergency or utility power, and for the lock-out of equipment during emergency power operation.

16800 EXECUTION

5.01 CONDUIT SYSTEMS

- A. Exposed conduits shall be installed parallel or at right angles to structures.
- B. Support exposed conduits at 5 foot intervals. Individual runs of conduits shall be supported by one hole conduit straps; groups of conduits shall be supported on Unistrut Channel with Uniclip Stainless Steel Conduit Supports.
- C. Conduit supports devices, i.e., straps, channel, etc., shall be attached to structure with wood screws on wood, toggle bolts on hollow masonry, lead shields on masonry and machine bolts on steel. Nails are not acceptable.
- D. Rigid aluminum conduit shall be attached to sheet metal enclosures with threaded hubs. All rigid conduit stub ups not attached to enclosures or attached to nonmetallic enclosures shall be terminated with insulated throat, grounding bushing.
- E. All conduits installed below grade shall be schedule 80 PVC and shall be installed 24 inches below finished grade. Where conduits turn up provide rigid aluminum elbow.
- F. Protect conduits against dirt, plaster, etc., with conduit plugs. Plug shall remain in place until all masonry is complete.
- G. All conduits entering or exiting concrete or installed below grade shall be protected from corrosion.
 - 1. Metallic conduits shall be protected from corrosion as follows:
 - a. Apply two coats of 3M Scotchrap pipe primer. Allow the primer to dry before application of the second coat or application of tape.
 - b. Apply two overlapping layers of 3M Scotchrap 51 tape.
 - c. Pipe primer and tape shall extend from the end of the metallic conduit to 6" above grade or concrete.
- H. All conduits entering electrical equipment from below grade and wet well shall be sealed with electrical putty.

5.02 CONDUCTORS

- A. Splices in branch circuit conductors shall be made with Skotchlok insulated connectors, Ideal Wing Nuts, or Buchanan Steel Crimping Sleeves, and nylon caps. Splices in motor junction boxes, wiring troughs and splices in conductors larger than No. 8 AWG shall be made with split bolt connectors, taped with Scotch No. 88 Tape.
- B. Only one conductor shall be installed under terminal of individual circuit breaker mechanical lug, neutral bus lug or grounding bus lug.

5.03 EQUIPMENT CONNECTIONS

- A. All equipment requiring electrical connections shall be connected under this section of these specifications. Where electrical connections to equipment requires specific locations, such location shall be obtained from shop drawings. Do not scale drawings for location of conduit stub-ups to serve specific equipment.
- B. Electrical circuits to equipment furnished under other sections of these specifications are based on design loads. If actual equipment furnished has loads other than design loads, electrical circuits and protective devices shall be revised to be compatible with equipment furnished and in compliance with the National Electrical Code at no additional cost to the Owner.
- C. Equipment furnished under other sections of these specifications to be connected under this section of the specifications shall consist of, but not be limited to, the following:
 - 1. Well Equipment
 - 2. Pumping Station Equipment
- D. The Contractors attention is directed to other sections of these specifications, where equipment requiring electrical service is specified, to become aware of the scope of work under this section of these specifications requiring electrical service and connections to equipment specified elsewhere.

5.04 GROUNDING

- A. The neutral conductor shall be grounded to a ground rod system. The minimum system grounding conductor shall be No. 6 Bare Copper.
- B. All non-current carrying parts of electrical equipment shall be grounded. The continuity of the ground shall be maintained using a green insulated grounding conductor installed in all raceways.
- C. Ground rods shall be installed with the top of the rod 12 inches below finished grade. Connections to ground rods shall be made with chemical weld connections.
- D. Upon completion of the ground rod installation the Contractor shall record the ground reading. This ground reading shall not be taken within 48 hours of rainfall. Results of

ground readings shall be forwarded immediately to the Engineer. Provide a minimum of three rods, the resistance to ground shall be below 25 OHMS. Provide additional ground rods as required to attain specified ground resistance.

- E. Grounding terminal of receptacles shall be grounded to grounding conductor and to outlet box with green insulated pigtail with 10/32 washer head machine screw.

5.05 GUARANTEE AND TEST

- A. Upon completion of the project all systems shall be tested for proper operation as directed by the Engineer or his representative. Equipment covers, i.e., panelboard, motor controls, etc., shall be removed where required for inspection of internal wiring. The Contractor shall furnish the personnel, tools and necessary equipment to inspect and test the system.
- B. Where ground readings are required, the Contractor shall provide a typewritten copy of certification of ground reading. Data shall indicate date readings were taken and lowest resistance recorded.
- C. All systems and component parts shall be guaranteed for one year from date of final acceptance of the completed project. Defects found during this guarantee period shall be promptly corrected at no additional cost to the Owner.

END OF SECTION

SECTION 16210

ENGINE DRIVEN EMERGENCY POWER SUPPLY SYSTEM

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. The work required under this section of the specifications consists of the installation of the complete Engine Driven Emergency Power Supply System. All materials and devices which are an integral part of this system shall be provided under this section of the specifications.
- B. Definition: The Emergency Power Supply System (EPSS) shall consist of one or more engine driven generator sets, each of which contains an engine directly coupled to an electric generator, together with the necessary switchgear, controls, accessories, transfer devices, and fuel supply to provide electric power for the duration of any failure of the normal power supply.
 - 1. Automatic Transfer Switch (ATS): An automatic transfer switch is self-acting equipment for transferring one or more load conductor connections from one power source to another.

1.03 QUALITY ASSURANCE

- A. The following specifications and standards are incorporated into and become a part of this specification by reference.
 - 1. National Fire Protection Association (NFPA):
 - a. NFPA-37 Combustion Engines
 - b. NFPA-70 National Electrical Code
 - c. NFPA-110 Emergency and Stand-By Power Systems
 - 2. Electrical Generating Systems Association (EGSA) Standards:
 - a. EGSA CEP2 Codes for Emergency Power by States and Major Cities
 - b. EGSA GTD3 Glossary of Standard Industry Terminology and Definitions
 - c. EGSA ECB1 Performance Standard for Engine Cranking Batteries
 - d. EGSA TSS1 Performance Standard for Transfer Switches for use with Engine Generator Sets
 - e. EGSA BCES1 Performance Standard for Battery Chargers
 - f. EGSA ICAE1 Performance Standard for Electric Generator Set Instrument Control and Auxiliary Equipment
 - 3. Institute of Electrical and Electronics Engineers (IEEE) Standards:
 - a. IEEE 446 IEEE Recommended Practices for Emergency and Standby Power Systems

- b. IEEE 472 Voltage Surge Withstand Capabilities
 - 4. National Electric Manufacturers Association (NEMA) Standards:
 - a. MG-1 Motors and Generators
 - b. ICS1-109 Test and Test Procedures for Automatic Transfer Switches
 - c. ICS2-447 A.C. Automatic Transfer Switch
 - 5. Underwriters Laboratories Inc. (UL) Publications:
 - a. UL 1008 Automatic and Non-Automatic Transfer Switches
 - 6. American National Standards Institute (ANSI):
 - a. C37.90a Voltage Surge Withstand Capability
- B. Acceptable Manufacturers: Products of the following manufacturers, which comply with these specifications, are acceptable:
 - 1. Engine Driven Generator Sets:
 - a. Preferred Manufacturer
 - i. Cummins
 - b. Acceptable Alternatives
 - i. Caterpillar
 - ii. Kohler
 - iii. MTU
 - 2. Transfer Switches:
 - a. Preferred Manufacturer
 - i. Cummins OTPC Series
 - b. Acceptable Alternatives
 - i. ASCO 7000 Series
 - ii. GE/ABB TrueOne
- C. Equipment Dimensions:
 - 1. Dimensions indicated (on the drawings) are maximum allowable and shall not be exceeded. Where equipment of acceptable manufacturers listed exceeds the maximum dimensions, products of such manufacturers shall not be acceptable.
- D. Coordination:
 - 1. Review shop drawings submitted under this and other sections, as well as other divisions, to ensure coordination between work required among different trades. Coordinate the installation sequence with other contractors to avoid conflicts and to provide the fastest overall installation schedule. Coordinate installation with structural features, equipment installed under other sections of the specifications, and electrical equipment to ensure access and to insure clearance minimums are provided.

1.04 SUBMITTALS

- A. Manufacturer's Product Data:
 - 1. Submit material specifications and installations data for products specified under Part 2
 - Products to include:
 - a. Engine driven generator sets
 - b. Transfer switches

- B. Shop Drawings: Submit shop drawings to indicate information not fully described by the product data to indicate compliance with the contract drawings. Submittals containing less than the information listed below will be rejected.
1. Shop drawings for the engine driven generator sets shall contain not less than the information listed as follows:
 - a. Continuous and stand-by rating of engine driven generator set(s) including voltage and phase.
 - b. Frequency and voltage regulation with maximum instantaneous voltage dip and time of recovery to stable operation.
 - c. Output voltage adjustment range in percentage of rated plant voltage.
 - d. Alternator type and method of connection to prime mover.
 - e. Components contained in alternator instrument panel.
 - f. Rating of engine at operating speed, engine cycle and number of cylinders.
 - g. Type of engine lubrication system and verification of components specified.
 - h. Type of engine governor.
 - i. Components contained in engine instrument panel.
 - j. Fuel consumption at rated load.
 - k. Starting batteries including ampere hour rating.
 - l. Verification that all accessories specified are to be provided. This includes cold weather starting aid with rating and voltage indicated, exhaust system with muffler type indicated, and outdoor housing (where applicable) with verification of space available within housing for batteries.
 - m. Line and machinery constants of the generator furnished.
 2. Shop drawings for the transfer switch shall contain not less than the information listed as follows:
 - a. List of accessories contained in the control panel.
 - b. Withstand rating in RMS symmetrical amperes.
- C. Quality and Service:
1. All materials and parts of the EPSS shall be new and unused. Each component shall be of current manufacture from a firm regularly engaged in the production of such equipment.
 - a. Units and components offered under these specifications shall be covered by the manufacturer's parts and labor warranty for a minimum of five years from date of Owner acceptance of the project on a new machine, a copy of which shall be included in the shop drawings submittal.
 - b. The warranty shall include both the generator and the automatic transfer switch.
 2. Submittals will be accepted only on engine driven generator sets and transfer switches which can be properly maintained and serviced without requiring the Owner to stock spare parts or wait longer than twenty-four hours for service. Submittals shall include the nearest location of permanent parts outlet from which parts may be obtained and written assurance that trained service personnel will be available on twenty-four hour's notice. Units with service centers more than 50 miles from project site will not be accepted.

D. Record Drawings

1. Include in each set one set of operating, maintenance, and parts manuals covering all components for the EPSS. Each supplier shall provide instructions to the Owner in operation and maintenance of his equipment, both in written form and with on-site personnel for a minimum of eight hours.
2. A schedule of each motor, indicating actual horsepower and means of starting, connected to the EPSS shall be provided to the Owner with the record drawings.

PART 2 PRODUCTS

2.01 ENGINE DRIVEN EMERGENCY POWER SUPPLY (EPS)

A. Engines

1. The engine driven emergency power supply (EPS) shall be an internal combustion propane driven prime mover. The generator set shall have the following characteristics:
 - a. 60 Hertz
 - b. 0.8 Power Factor
 - c. 3 Phase
 - d. 4 Wire
 - e. Fuel Consumption: as noted on the plans
 - f. Fuel Supply Pressure: as noted on the plans
 - g. Fuel: Propane

Location	KW/KVA	Voltage	Max One-Step Load & Step	Non-Controlled Load	Motors
PS-3	150/188	480Y/277, 3 Phase, 4 Wire	86.6KW Step 1	7.5KVA	2 – 58Hp 1 – 1.5HP
PS-4	77/96	208Y/120, 3 Phase, 4 Wire	26.07KW Step 1	7.5KVA	2 – 25HP 1 – 1.5HP
PS-5	40/50	208Y/120, 3 Phase, 4 Wire	23.5KW Step 1	7.5KVA	2 – 2.0HP 1 – 1.5HP
PS-6	80/100	480Y/277, 3 Phase, 4 Wire	25.57KW Step 1	7.5KVA	2 – 2.0HP 1 – 1.5HP
PS-8	53/66	480Y/277, 3 Phase, 4 Wire	25.22KS Step 1	7.5KVA	2-17.1HP 1-1.5HP
PS-12	40/50	480Y/277, 3 Phase, 4 Wire	22.58KW Step 1	7.5KVA	2-2.7HP 1-1.5HP

Well #2	70/88	480Y/277, 3 Phase, 4 Wire	58.1KW Step 2	25KW	1-40HP
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2. The rated net horsepower of the engine at the generator synchronous speed, with all accessories, shall not be less than that required to produce the KW specified in paragraph 1 above. The horsepower rating shall take into account generator efficiency and all accessory losses such as fans, battery charger, etc. The generator set shall be capable of producing the specified KW (without overload) for the duration of the power outage, under the following ambient conditions:
 - a. Altitude: 100 feet above mean sea level.
 - b. Air temperature at engine intake: 104 degrees F.
 - c. Humidity Range: 25 - 95 %.
3. Included with the shop drawing submittal shall be the manufacturer's estimate of supply fuel and oil consumption for the engine. The engine shall have an oil filter with replaceable elements and a lube oil cooler.
4. The engine shall be equipped with a suitable governor (engine speed control) to maintain frequency within limit specified below by controlling engine and generator speed. Manufacturer shall indicate in submittal data whether mechanical, hydraulic, electrical, or hybrid governors are provided.
 - a. Type: Droop - $\pm 1/4\%$ maximum
 - b. Stability: $\pm 1/2\%$ maximum steady state frequency variation at any constant load from no load to full load.
 - c. Regulation: 5% maximum frequency deviation between no-load steady state and full load steady state.
 - d. Transient: 3 seconds maximum recovery time for maximum motor start.
5. The engine shall be electric start, provided with a solenoid energized motor with either positive engagement or clutch drive to the engine.
The engine starting batteries shall be sealed lead-acid recombination type. Batteries shall be rack mounted inside the weatherproof plant housing to minimize the distance from the batteries to the starter.
6. A float type battery charger, compatible with the batteries selected, shall be furnished at the engine which shall maintain the starting batteries at full charge. The charging system shall permit charging from either the normal or the emergency power source. It shall have an equalize rate and a float rate charging system. An ammeter and voltmeter shall indicate the charge rate and the circuit shall be protected by either fuses or circuit breakers. The charger or charging circuit shall be so designed that it will not be damaged during the engine cranking cycle, for example, by a current limiting charger or a crank disconnect relay. It shall also be capable of recharging a discharged battery in 12 hours while carrying normal loads. The charger shall be equipped with alarm relays as required for remote annunciation equipment. Provide stranded wire between battery charger and termination points on the generator. Terminate with Stacon connectors.
 - a. Provide battery strap(s) and heater per NFPA 110.
7. The engine shall be liquid cooled. The type of liquid cooling system shall be unit mounted radiator - consideration shall be given for air temperature rise across the

engine in addition to ambient. Minimum capacity shall be rated for 100°F. minimum engine ambient temperature plus air temperature rise across the engine.

- a. Provide an electric heater, thermostatically controlled, in the engine coolant system as a cold weather starting aid. Heater shall be for operation on 208 or 230 volt single phase A.C. for 2000 watt units and shall be permanently connected to a circuit from the pump station electrical system. Heater shall maintain 70°F. to 90° F.
 - b. Provide isolation valves or quick connects for coolant heater.
8. Air Supply/Exhaust System
- a. Cleaner: An air cleaner and silencer shall be furnished, located and mounted as recommended by the engine manufacturer.
 - b. Exhaust: An exhaust system of suitable size, configuration, and material in accordance with engine manufacturer's recommendations shall connect the exhaust outlet of the engine to a silencer. The type of silencer shall meet the requirements of engine manufacturers and shall be commercial. The silencer shall be located on top of the outdoor enclosure.
 - c. The exhaust system including silencer shall be of such size that back pressure on the system will not exceed the back pressure permitted by the engine manufacturer's recommendation. A flexible connection shall be mounted at the engine exhaust outlet and the discharge end shall be protected against entry of precipitation. Piping and silencer within reach of personnel or with 8'-0" of finished floor or grade shall be protected by screening and shall be insulated with two inches of calcium silicate insulation with aluminum jacket. All exhaust piping shall be gas tight. Exhaust shall exit vertically.
9. The engine instrument panel shall be mounted at the engine and shall contain the following:
- a. Oil pressure gauge to indicate lubricating oil pressure.
 - b. Temperature gauge to indicate cooling medium temperature.
 - c. Hour meter to indicate total actual running time.
 - d. Battery charging meter to indicate satisfactory performance of battery charging means.
 - e. Other instruments as recommended by the manufacturer for proper maintenance.

B. Generator

1. The generator shall be an engine-driven single or two bearings type, synchronous, brushless, conforming to applicable standards. It shall be connected to the engine flywheel by means of a flexible type coupling for single bearing generators and elastic coupling for two bearing generators.
2. The generator shall be rated for 40°C. ambient. Class of insulation shall be NEMA Class F. The voltage regulation shall be plus or minus 2% from no load to full load with plus or minus 5% speed change and a 15°C. rise in ambient. The generator voltage dip from no load to full load shall not exceed 20%.
3. The generator shall be capable of sustaining at least 250% of rated current for at least ten (10) seconds under a three-phase symmetrical short by inherent design or by the addition of an optional current boost system. A resettable line sensing circuit breaker shall be furnished which protects the generator from damage due to its own high current

capability. This breaker shall not trip within the ten seconds specified above to allow selective tripping of downstream fuses or circuit breakers under a fault condition.

4. The generator shall be a permanent-magnet type generator.
5. Provide 120 volt condensation heater with thermostat.

C. Voltage Regulation

1. The generator shall be equipped with a volts-per-hertz type voltage regulator to maintain voltage within limits specified below:
 - a. Stability: $\pm 2\%$ maximum voltage variation at any constant load from no load to full load.
 - b. Regulation: 4% maximum voltage deviation between no load steady state and full load steady state.
 - c. Transient: 30% voltage dip or overshoot on one-step application or removal of 0.8 power factor full load.
 - d. Transient: 3% seconds maximum voltage recovery time with application or removal of 0.8 power factor full load.

D. Generator full main line circuit breaker.

1. A main line circuit breaker shall be supplied to protect the generator, trip settings, etc. and controls from overloads and/or short circuits in the load. Interrupting current shall be as indicated on the drawings. Breakers shall comply with UL 489 and NEMA AB-3.

E. Start and Stop Controls

1. Automatic starting and stopping controls shall be furnished to start the engine automatically when the normal electrical power fails or falls below specific limits and to stop the engine automatically after the normal power supply resumes. The signal for starting or stopping the engine shall be sensed through an auxiliary contact in the automatic transfer switch. The controls shall be capable of operating at 50% of normal DC system supplied voltage.
2. The cranking cycle shall be initiated by manual start, loss of normal power at the transfer switch, clock exerciser, or the manually operated test switch at each ATS.
3. Crank control and the time delay relays shall provide a minimum of 4 crank attempts of at least 7 seconds each, separated by appropriate rest periods. A sensing device shall automatically disconnect the starting circuit when the engine has started. If the engine has not started at the completion of the starting program, the overcrank signal shall indicate. The engine starting controls shall be locked out and no further starting attempts shall take place until the overcranking device has been manually reset.
4. A selector switch shall be incorporated in the automatic engine start and stop controls. It shall include an "off" position that prevents manual or automatic starting of the engine; a "manual" position that permits the engine to be started manually by the pushbutton on the control cabinet and run unloaded; an "automatic" position that readies the system for automatic start or stop on demand or the automatic load transfer switches or of the programmed exerciser.
5. A remote manual stop station similar to a weatherproof break-glass station shall be provided mounted on the face of the automatic transfer switch and generator enclosure and shall be tied into the engine controls to stop the engine when activated. Provide

laminated plastic label with 1/4" minimum engraved letters to read "EMERGENCY GENERATOR SHUTDOWN". Background to be red and core to be white.

F. Instrumentation

1. Local and remote engine control and safety panel shall be provided, containing the following:
 - a. Automatic remote start capability.
 - b. "Manual-Off-Auto" switch.
 - c. Controls to shut down and lock out the prime mover under the following conditions: failure to start after specified cranking time, overspeed, low lubricating oil pressure, high engine temperature, operation of remote manual stop station.
 - d. Battery powered individual alarm indication to annunciate visually at the control and safety panel the occurrence of any condition itemized below; contacts or circuits for a common audible alarm signaling locally. Test switch shall be provided to test the operation of all lamps.

Indicator Function	Level 1	
(At Battery Voltage)	C.V.	S
i. Overcrank	X	X
ii. Low Water Temp.< 70°F (21°C)	X	X
iii. High Engine Temp.Pre-alarm	X	
iv. High Engine Temp.	X	X
v. Low Lube Oil Pressure Pre-alarm	X	
vi. Low Lube Oil Pressure	X	X
vii. Overspeed	X	X
viii. EPS Supplying Load	X	
ix. Control Switch Not In Auto Pos.	X	
x. Battery Charger Malfunctioning	X	
xi. Low Voltage in Battery	X	
xii. Lamp Test	X	
xiii. Contacts for Local & Remote Common Alarm	X	
xiv. Audible Alarm Silencing Switch		
xv. Emergency Stop	X	X

Key:

C.V. -- Control Panel-Mounted Visual Indication

S -- Shutdown of EPS

X -- Required

- e. Controls to shutdown the prime mover upon removal of initiating signal or manual emergency shutdown.
 - f. A.C. voltmeter with selector switch off position and positions for phase to phase and phase to neutral.
 - g. A.C. ammeter with selector switch with positions for each phase.
 - h. Frequency meter -- digital electronic type.
 - i. Voltage adjusting rheostat to allow plus or minus 5% voltage adjustment.
 - j. Manual reset circuit breaker.
 - k. Water temperature gauge.
 - l. Manual stop/start control.
 - m. Elapsed time meter.
 - n. Panel lights.
 - o. Indicator lights for signals from engine instrument panel.
 - p. Light to indicate switch has been left in the "off" position.
- 2. All instruments, controls, and indicating lights shall be properly identified. All wires shall be individually identified and must agree with the wiring diagram provided. All wiring shall be harnessed or flexibly enclosed. Terminals on all terminal blocks shall be individually identified. All instrumentation must be isolated from engine generator set vibration.
 - 3. Field coordinate with the owner for the location of the remote annunciator panel.

G. Enclosures and Connections:

- 1. All electrical enclosures, i.e, terminal cabinets, wireways, circuit breaker enclosures, etc., shall be of adequate size to provide minimum bending radii as required by the NEC for the size conductor actually terminated within or passing through the enclosure.
 - 2. All factory provided enclosures shall have gasketing and finish appropriate for the environment in which the unit is to be mounted. All wiring, wiring harness, etc., shall be protected from the elements, such as direct sunlight, moisture, etc. or shall be UL listed for direct exposure to the applicable elements. Include written documentation of the above with the shop drawing submittal.
- H. Provide flexible fuel connections at supply piping. Flexible hoses shall be steel reinforced type. Provide solenoid valve in series with gate valve in supply line. Solenoid valve shall be powered from generator batteries and shall be open only when generator is running.

2.02 TRANSFER SWITCH

- A. Transfer switch shall be rated at not less than as indicated on the drawings.
- B. Transfer switch serving three phase four wire loads shall be four pole. Provide timed transition type switch with intermediate position. In-phase transition is not permitted.

- C. Transfer switch shall be the automatic type with power contact assemblies.
- D. Transfer switch shall be rack mounted on stainless steel channels in a NEMA 4X stainless steel enclosure. Enclosure shall have hinged door with locking three-point latch.
- E. Operation shall be inherently double-throw whereby all contacts move simultaneously. Electrical spacing shall be equal to or exceed those listed in Table 15.1 of UL-1008. Only those main contact structures specifically designed for transfer switch service shall be acceptable. An overload or short circuit shall not cause the switch to go to a neutral position. A manual operating handle shall be provided. All main contacts shall be silver alloy type protected by arc quenchers and, for switches rated 600 amps and larger, by arcing contacts. Operating transfer time shall be 1/15 second or less on switches rated below 600 amps. The transfer sequence shall be "Open Transition".
- F. All switch and contacts, coils, springs and control elements shall be removable from the front of the transfer switch without removal of the switch panel from the enclosure and without disconnecting power conductors or drive linkages. Control and sensing relays shall be continuous duty industrial type with minimum contact rating of ten amps.
- G. Transfer switch shall be rated to withstand in RMS symmetrical amperes not less than the available symmetrical RMS amperes when protected by the circuit protective device on the line side of the transfer switch. Withstand rating of switch shall be based on switch contacts not welding under fault conditions.
- H. The control panel for each automatic transfer switch shall contain the following accessories and Features.
 - 1. ATS Control Panel
 - a. The automatic transfer switch(es) shall provide a control panel mounted into the front of the switch. This control panel shall display source condition information including:
 - b. AC voltage for each phase of normal and emergency source. All phases shall be displayed on a single screen for viewing of voltage balance and the line to neutral voltage shall be displayed for each phase.
 - c. Frequency of each source.
 - d. Display source status including indication whether source is/is not connected.
 - 2. The ATS control panel shall allow the operator to adjust and/or set nominal voltage and frequency of the ATS, frequency sensor operation set points, time clock functions, and load sequence functions. The operator may also enable/disable ATS functions, set up exercise and load test operation conditions, normal system time delays for transfer, time delay to start, stop, transfer and retransfer. These parameters may only be accessed following password input from the authorized operator.
 - 3. The display shall include real time clock data, including date, time (HH:MM:SS) and log total operating hours for the control system.
 - 4. The display shall include a service history for the ATS and a fault history on the ATS.

5. Adjustable 0.5 to 6 second time delay on starting of EPS to override momentary power dips and interruptions of the normal services. Time delay shall be factory set at 1 second.
6. Time delay on transfer to emergency adjustable from 0 to 60 seconds, factory set at 0 seconds.
7. Test switch on enclosure door to simulate failure of the normal power source. ATS shall transfer load to the EPS.
8. Push button to bypass time delay on re-transfer to normal.
9. Close differential voltage sensing shall be provided on all phases of the normal power supply. The pickup voltage shall be adjustable from 85% to 100% of nominal and the dropout voltage shall be adjustable from 75% to 98% of the pickup value. The transfer to emergency will be initiated upon reduction of normal source to 85% of nominal voltage and re-transfer to normal shall occur when normal source restores to 95% of nominal.
10. Independent single phase voltage and frequency sensing of the emergency source. The pickup voltage shall be adjustable from 85% to 100% of nominal. Pickup frequency shall be adjustable from 90% to 100% of nominal. Transfer to emergency upon normal source failure when emergency source voltage is 90% or more of nominal and frequency is 95% or more of nominal.
11. A time delay on re-transfer to normal source. The time delay shall be automatically bypassed if the emergency source fails and normal source is available. The time delay shall be field adjustable from 0 to 25 minutes and factory set at 15 minutes.
12. An unloaded running time delay for emergency generator cool-down, factory set at 5 minutes.
13. Provide adjustable timed intermediate position in both directions.
14. Pilot light for indicating switch in normal position (include fuses and auxiliary contact).
15. Pilot light for indicating switch in emergency position (include fuses and auxiliary contact).
16. An exerciser for exercising standby power plant on a weekly basis shall be provided in the transfer switch. Exerciser shall be set to exercise standby plant for one half hour per week under load. Time of plant exercise shall be set in field. Exerciser timer shall have reserve power back-up, either by battery or spring-wound clock, to ride through power outages to the switch.

2.03 FUEL SUPPLY

- A. The owner will coordinate with the propane supplier for service to the generator. Refer to manufacturers furnished submittal information for required nature of fuel supply (liquid vs vapor, pressure, CFH, etc.).
- B. Coordinate with Paul Norris, Beaufort Gas (Charleston Gas Co.), 843-557-0176.
- C. The fuel supply shall provide for 36 hours of operation at full load.

PART 3 EXECUTION

3.01 EPS INSTALLATION

- A. The plant shall be anchored to a concrete base whose overall dimensions shall exceed the outside dimensions of the plant base by 12" in each direction. Base depth shall be 12". Reinforce base with No. 5 bars 12" on center in both directions. Use not less than 6-3/4" galvanized anchor bolts.
- B. The plant shall be on a welded steel base with a minimum of four vibration isolators, with two each located under the generator mounting and the engine front support on each side of the steel base. Isolators shall consist of steel springs designed specifically for this application, mounted on rubber plates to block high frequency vibrations.
- C. Provide a laminated sign at the service entrance equipment indicating type and location of on-site emergency power sources.
- D. For exterior installations, the EPS shall be provided in outdoor, weatherproof aluminum housing with removable panels for access to equipment. Provide sound attenuating (70.5dB(A) at seven meters average) weatherproof housing. The starting batteries shall be rack mounted within the housing. Furnish service light and switch within weatherproof housing.
- E. Extend 208, 240 and 120 volt emergency power circuits for battery charger and cold weather starting aids from the pump control panel.

3.02 TRANSFER SWITCH INSTALLATION

- A. Wall mounted transfer switch shall be installed with top of switch no more than seven feet above finished floor. Locate transfer switch to provide working clearance and full accessibility as required by the National Electrical Code.
- B. Lace and group conductors installed in transfer switch with nylon tie straps. Only one conductor shall be installed under terminals. Form and train conductors in enclosure neatly parallel and at right angles to sides of box. Uninsulated conductor shall not extend beyond one-eighths inch from terminal lug. Conductors shall be installed such that no stresses are transferred to terminal lugs.
- C. Mounting and Support
 - 1. Mounting
 - a. Enclosure shall be secured to structure by a minimum of eight (8) fastening devices. A 1.5-inch minimum diameter round washer shall be used between head of screw or bolt and enclosure.
 - b. Enclosures shall be mounted where indicated on the drawings or specified herein. Support from the structure with fastening device specified.
 - c. Attach enclosure directly to masonry, concrete, or wood surfaces.

- d. Mount enclosure on metal channel (strut), which is connected to structure with fastening device specified, for installations on steel structure, sheet metal equipment enclosure, or sheet rock walls.
- e. Where enclosure is not indicated on a wall or structure, construct a metal channel (strut) free standing frame secured to floor, pad, or other appropriate building structure. Refer to the detail on the drawings for frame installation and construction information.
- f. Do not splice conductors in enclosure. Where required, install junction box or wireway adjacent to transfer switch and splice or tap conductors in box. Refer to number of conductors in a conduit limitation defined in the WIRES AND CABLES section of the specifications and do not exceed.
- g. Conductors not terminating in transfer switch shall not extend through or enter transfer switch enclosure.
- h. Install push-in knock-out closure plugs in any unused knock-out openings.
- i. Cleaning and Adjustment
 - 1) After completion, clean the interior and exterior of dirt, paint and construction debris.
 - 2) Touch up paint all scratched or marred surfaces with factory furnished touch up paint of the same color as the factory applied paint.

3.03 TESTING

- A. Submit verification letter to Engineer indicating successful completion of sequence of operations testing and certification that all functions are operational. Letter to request load testing approval and schedule of proposed test. Prior to load test, written approval must be provided by Engineer. Representatives of the generator and transfer switch shall be present. The local authority having jurisdiction shall be given advance notification of the time of the final test in order that he may witness the tests.
- B. A failure of any test or any component during a test will require a complete retest program at no additional cost to the Owner.
- C. Provide all lubricants and other consumables for testing.
- D. An on-site acceptance test shall be conducted as a final approval test for all Emergency Power Supply Systems.
 - 1. The test shall be conducted after completion of the installation with all EPSS accessory and support equipment in place and operating.
 - 2. Test Results. The EPSS shall perform within the limits specified for Level I installation per NFPA-110.

3.04 O&M MANUAL

- A. At least three sets of an instruction manual(s) for all major components of the EPS shall be supplied by the Manufacturer(s) of the EPS and shall contain:
 - 1. A detailed explanation of the operation of the system.
 - 2. Instruction for routine maintenance.

3. Detailed instructions for repair of the EPS and other major components of the EPS.
4. Pictorial parts list and part numbers.
5. Pictorial and schematic electrical drawings of wiring systems, including operation and safety devices, control panels, instrumentation and annunciators.

END OF SECTION

**TOWN OF RIDGELAND
WATER AND SEWER RESILIENCY IMPROVEMENTS PROJECT**

APPENDIX A

**GEOTECHNICAL ENGINEERING REPORT
RIDGELAND PUMP STATIONS, RIDGELAND, SOUTH CAROLINA
TERRACON PROJECT NO. HG215050
JANUARY 28, 2022**



Geotechnical Engineering Report

**Ridgeland Pump Stations
Ridgeland, South Carolina**

January 28, 2022
Terracon Project No. HG215050

Prepared for:

Four Waters Engineering, Inc.
Jacksonville Beach, Florida

Prepared by:

Terracon Consultants, Inc.
Bluffton, South Carolina



January 28, 2022

Four Waters Engineering, Inc.
324 6th Avenue N.
Jacksonville Beach, Florida 32250



Attn: Ms. Angela Bryan
P: (904) 414 2400 ext. 51
E: abryan@4weng.com

Re: Geotechnical Engineering Report
Ridgeland Pump Stations
Ridgeland, South Carolina
Terracon Project No. HG215050

Dear Ms. Bryan:

We have completed the Geotechnical Engineering services for the above referenced project. This study was performed in general accordance with Terracon Proposal No. PHG215050 dated November 5, 2021. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

A handwritten signature in cursive script that reads "Matthew Bemis".

Matthew Bemis, E.I.T.
Staff Geotechnical Engineer



Guoming Lin, Ph.D., P.E., D.GE
Senior Consultant



REPORT TOPICS

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- SITE CONDITIONS..... 1
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Note: This report was originally delivered in a web-based format. For more interactive features, please view your project online at client.terracon.com.

EXHIBITS

EXHIBIT A: Exploration and Testing Procedures

EXHIBIT B: Exploration and Testing Results

EXHIBIT C: Supporting Information

Note: Refer to each individual Attachment for a listing of contents.

REPORT SUMMARY

Topic	Overview Statement ¹
Project Description	<ul style="list-style-type: none"> ■ The project includes the construction of wet wells at two existing pump stations. ■ Pump station 3 (PS3): the wet well will have an approximately 12 feet inner diameter with 25 feet depth. ■ Pump station 4 (PS4): the wet well will have an approximately 8 feet inner diameter with 21 feet depth. ■ The existing elevation on the site of Pump Station 3 is about +23' to +24' EL. The existing elevation on the site of Pump Station 4 is about +32' to +33' EL. ■ Loading information for the pumps are provided, while the generators information is not available. We assumed the maximum slab load of 250 psf for settlement analysis.
Geotechnical Characterization	<ul style="list-style-type: none"> ■ The site for Pump Station 3 generally consists of soft sandy clay in the upper 10 feet below ground surface (BGS), followed by medium stiff to very stiff sandy silt to the depth of 20 feet BGS, and medium dense silty sand to the depth of 28 feet BGS. Below the sand layer, it is underlain by very stiff sandy clay to the termination of CPT sounding at 35 feet BGS. ■ The site for Pump Station 4 generally consists of loose to medium dense silty sand in the upper 8 feet, followed by soft to very stiff sandy silt / clay to the termination of CPT sounding at 34 feet BGS. ■ Groundwater depths were recorded at 1.4 feet BGS at PS3 and at 5 feet BGS at PS4. These water tables may be perched water due to the shallow clayey soils. ■ Please refer to the Geotechnical Characterization section.
Earthwork Recommendations	<ul style="list-style-type: none"> ■ Install a site drainage system. ■ Strip/grub topsoil when encountered (note: rutting of subgrade can cause mixing of topsoil with underlying soils, which may require additional topsoil stripping) ■ Level and densify subgrade during subgrade preparation. If any soft/weak areas are detected repair subgrade by undercut and backfill. ■ During open excavation use either sloped excavation or temporary retaining walls to support the sides of the excavation.
Slab or Mat Foundations	<ul style="list-style-type: none"> ■ The maximum settlement was estimated less than 1 inch for the pumps and generators. ■ A slab or mat foundation will be sufficient to support the wet wells and equipment (generators and pumps) after the subgrade has been improved with undercut and backfill or densification. A minimum of 12" thick #57 stone is recommended at the bottom for the wet well support. If the wet well has a concrete base, the wet well can be set on the GAB layer. The extent and depth of undercut will largely depend on the subgrade moisture, site drainage and the weather. ■ Allowable bearing pressure = 2,000 psf for the slab or mat foundation design.

Geotechnical Engineering Report

Ridgeland Pump Stations ■ Ridgeland, South Carolina

January 28, 2022 ■ Terracon Project No. HG215050



**General
Comments**

This section contains important information about the limitations of this geotechnical engineering report.

1. This summary is for convenience only. It should be used in conjunction with the entire report for design purposes.
-

Geotechnical Engineering Report

Ridgeland Pump Stations

Ridgeland, South Carolina

Terracon Project No. HG215050

January 28, 2022

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed two wet wells to be located at Jacob Smart Blvd and James Taylor Drive in Ridgeland, South Carolina. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil condition
- Groundwater conditions
- Site preparation and earthwork
- Foundation design and construction
- Seismic site classification per IBC

The geotechnical engineering scope of services for this project included the advancement of 2 CPT soundings to a maximum depth of 35 feet below existing site grades (BGSs).

A general soil profile and discussion of subsurface conditions encountered at each sounding location are included in the **Geotechnical Characterization** section of this report. Maps showing the site and boring locations are shown in **Exhibit A**.

SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	<p>The project is located at two separate sites located in Ridgeland, South Carolina.:</p> <ul style="list-style-type: none">■ Pump Station 3 located east of North Jacob Smart Blvd. Latitude: 32.4875°, Longitude: -80.9744°■ Pump Station 4 located at the northwest corner of Blue Heron Dr. and James Taylor Dr. Latitude: 32.4791°, Longitude: -80.9728° <p>See Exhibit A.</p>
Existing Improvements	<p>Both sites have an existing pump station.</p>

Item	Description
Current Ground Cover	Grassy area
Existing Topography	The existing elevation on the site of pump station 3 between +23' and +24' EL. The existing elevation on the site of pump station 4 between from +32' and +33' EL

PROJECT DESCRIPTION

Our initial understanding of the project was provided in our proposal and was discussed during project planning. Our final understanding of the project conditions is as follows:

Item	Description
Information Provided	Map exhibits created by Four Waters Engineering were provided via email on October 29, 2021
Project Description	The project includes the design and installation of two wet wells at existing pump stations.
Proposed Structure	Based on email communication with Four Waters Engineering, we understand: <ul style="list-style-type: none"> ■ Wet well at PS3 has an approximately 12 feet inner diameter with 25 feet depth. ■ Wet well at PS4 has an approximately 8 feet inner diameter with 21 feet depth.
Finished Floor Elevation	Based on the survey drawings with Four Waters Engineering dated 8/20/2021, the FFE to be about +23.6' EL for PS3 and +33' EL for PS4
Maximum Loads	<ul style="list-style-type: none"> ■ Based on email communication, we understand the total pump's weights will be 3,220 lb and 1,850 lb at PS3 and PS4 respectively. The soil pressures under the foundation of the wet well were estimated to be 28 and 36 psf for PS3 and PS4, respectively. ■ Load for generator was not provided at this time. ■ We assumed the maximum slab load 250 psf for generator pads (about 4' x 8') and equipment pads (3' x 7.5').

GEOTECHNICAL CHARACTERIZATION

Subsurface Profile

We have developed a general characterization of the subsurface soil and groundwater conditions based upon our review of the data and our understanding of the geologic setting and planned construction. The following table provides our geotechnical characterization.

The geotechnical characterization forms the basis of our geotechnical calculations and evaluation of site preparation, foundation options, and pavement options. As noted in **General Comments**, the characterization is based upon widely spaced exploration points across the site, and variations are likely.

Subsurface Condition at PS3 (C01)

Stratum	Approximate Depth to Bottom of Stratum (feet)	Material Characterization	Consistency/ Relative Density
1	10	Sandy clay	Soft
2	20	Sandy silt	Medium stiff to very stiff
3	28	Silty sand	Medium dense
4	35, termination of CPT sounding	Sandy silt	Very stiff

Subsurface Condition at PS4 (C02)

Stratum	Approximate Depth to Bottom of Stratum (feet)	Material Characterization	Consistency/ Relative Density
1	8	Silty sand	Loose to medium dense
2	34, termination of CPT sounding	Sandy silt / clay	Soft to very stiff

Conditions encountered at each exploration location are indicated on the individual logs shown in **Exhibit B** attached to this report. Stratification boundaries on the CPT sounding logs represent the approximate location of changes in native soil types; in situ, the transition between materials may be gradual.

Groundwater Conditions

The boreholes were observed while drilling and after completion for the presence and level of groundwater. The water levels observed in the boreholes can be found on the logs in **Exhibit B** and are summarized below.

Boring Number	Approximate Depth to Groundwater Below Ground Surface (feet)
C01	5
C02	1.4

The sites for both pump stations are underlain by a thick layer of clays with silt below the topsoil and surface crust. This soft clay layer has poor drainage characteristics and has the potential to cause a perched water table and destabilize the subgrade.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the structure may be higher or lower than the levels indicated on the logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

The following evaluation and recommendations are based upon our understanding of the proposed construction and the results from our field exploration. If the above-described project conditions are incorrect or changed after this report, or subsurface conditions encountered during construction are significantly different from those reported, Terracon should be notified, and these recommendations must be re-evaluated to make appropriate revisions.

Geotechnical Considerations

The subsurface conditions are considered typical for the area. The generalized soil profile is presented in the **Geotechnical Characterization** section.

Based on email communication, the pump stations mainly include wet wells, pumps, generator and an equipment pad. Shallow foundation settlement analysis was performed using the soil parameters derived from the CPT soundings and the assumed structural loads.

Based on the analysis, total settlements were estimated to be less than 1 inch. The proposed structures can be supported on a shallow foundation system after the subgrade soils are improved with different methods:

- Wet well: a slab or mat foundation system should be sufficient after the subgrade soils are improved with undercut and backfill with 24 inches No.57 stone wrapped in geotextile fabric. The geotextile fabric should use Mirafi N-series 160N polypropylene geotextile fabric, or equal.
- Equipment pads for generators: a shallow foundation system should be sufficient after the subgrade soils are improved with densification or undercut and backfill with well compacted fill.

If heavier structural loads are required than those discussed above, or if the site will receive significantly more fill, Terracon should be retained to perform the additional evaluation.

A net allowable bearing capacity of 2,000 pounds per square foot (psf) is recommended for shallow foundation design after achieving a stable subgrade. The allowable bearing capacity may be increased by 1/3 for transient wind load and seismic load conditions. Terracon should be retained to confirm and test the subgrade during construction to provide more specific recommendations on subgrade repair based on the conditions at the footing subgrade.

After the pit excavation, exposed soft clays can present challenges to site work and subgrade stability. The construction should be prepared for subgrade improvements.

Stockpiling of excavated material in proximity to the excavation should be avoided as the upper soft soils are vulnerable to bearing failure adjacent to the well. In general, a distance of half the excavation depth on both sides of the trench should be kept clear of any excavated materials. If this is not possible due to the space limitations, the retaining wall design should take into consideration the surcharge loads from the excavated materials. This is an important consideration.

Care should be taken during excavations as there is the possibility that sloughing, or caving of the excavation trench or excavation slope may cause movement of the surrounding soils leading to a possible settlement of the neighboring structures or features.

We recommend hand auger borings and dynamic cone penetration (DCP) testing be performed during construction to evaluate and confirm the subgrade conditions under the footings. It is anticipated that subgrade soil undercutting may be required during subgrade preparation for the foundation.

During site preparation, topsoil, organic matter, stumps, or other unsuitable materials should not be left in subgrade under buildings or pavements. All footings/slab and pavement should bear on suitable natural soil, or on properly compacted structural fills. Compacted fill should be placed directly on suitable natural soil. We recommend Terracon be retained to test the footing subgrade during construction so that Terracon can provide additional recommendations to prepare the subgrade based on the conditions uncovered during the footing preparation.

EARTHWORK

The site work conditions will be largely dependent on the weather and contractor's means and methods in controlling surface drainage and protecting the subgrade. Site preparation should include installation of a site drainage system, subgrade preparation, and, densification.

The following paragraphs present our considerations and recommendations for the site and subgrade preparation.

Site Drainage

An effective drainage system should be installed prior to site preparation and grading activities to intercept surface water and to improve overall shallow drainage. The drainage system may consist of perimeter ditches supplemented with parallel ditches and swales. Pumping equipment should be prepared if the above ditch system cannot effectively drain water away from the site, especially during the rainy season. The site should be graded to shed water and avoid ponding over the subgrade.

Bore Pit Excavation

Based on the information provided, we understand that the wet well will be open excavated to depths of approximately 25 and 21 feet BGS for Pump stations 3 and 4, respectively. Based on the CPT sounding performed to a depth of approximately 35 feet BGS, soft to medium stiff clays will be encountered during the excavation. These soils are sensitive to moisture and erosion during construction. The contractor should provide methods to control site drainage and provide erosion control of the excavated slope face.

Depending upon the depth of excavation, dewatering should be planned for deep excavation. Groundwater depths were estimated from 1 to 5 feet BGS based on the recorded groundwater from the CPT soundings.

To support the excavation and dewatering activities, a temporary sheet pile wall or similar earth retaining structure should be constructed unless there is a space for a sloped excavation. Shoring may be required to support the temporary retaining structure in order to prevent slope sliding or collapse. If open-pit excavation methods are used for the construction of the entrance and exit pits, a slope inclination of 2.5 horizontal to 1 vertical or flatter is recommended for slope height less than seven feet due to the nature of the surface soils. A more detailed slope stability analysis should be performed for a slope higher than 7 feet based on the soil conditions and slope configurations. In all cases, excavations should conform to OSHA guidelines. More details are presented in the **Lateral Earth Pressures** section.

If the caisson method is considered instead of the sloped open excavation, temporary steel casing or other retaining structures are required. Soil parameters for the retaining structure are provided in the **Soil Parameters for Retaining Wall** section.

Densification

Prior to fill placement on the subgrade, the entire areas should be densified with a heavy-duty static roller to achieve a uniform subgrade. After densification if any weak areas are detected, they should be undercut, backfilled and then properly compacted. It is anticipated that some amount of subgrade undercutting may be required during subgrade preparation.

Fill Material Types

Fill required to achieve design grade should be classified as structural fill. Earthen materials used for structural fill should meet the following material property requirements:

Soil Type ¹	USCS Classification	Acceptable Parameters (for Structural Fill)
Granular	GW, GP, GM, GC, SW, SP, SM, SC	Less than 25% Passing No. 200 sieve

1. Structural fill should consist of approved materials free of organic matter and debris. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to use on this site.

Based on the findings from our CPT soundings, the PS3 site consists of silty sands (SM) and sandy clays (CL) in the upper 5 feet (BGS). While the PS4 site consists of silty sand (SM) and clayey sand (SC) in the upper 5 feet BGS. The silty sands (SM) are generally considered suitable for structural fill, provided that the soils are free of roots, organics or other foreign materials. Clayey sands (SC) may be considered marginally suitable while sandy clays (CL) are deemed unsuitable for structural fill.

We define marginally suitable as the soils that may require extra effort to adjust the moisture before they can be compacted. The amount of effort required will be highly dependent on the season and the weather conditions during construction. We recommend Terracon be retained during construction to determine the suitability of the onsite soil as fill material.

Fill Compaction Requirements

Structural fill should meet the following compaction requirements.

Item	Structural Fill
Maximum Lift Thickness	8 to 10 inches or less in loose thickness when heavy, self-propelled compaction equipment is used 4 to 6 inches in loose thickness when hand-guided equipment (i.e. jumping jack or plate compactor) is used
Minimum Compaction Requirements ¹	95% of max. below foundations and below finished pavement subgrade
Water Content Range ¹	Granular: -3% to +3% of optimum

1. Maximum density and optimum water content as determined by the modified Proctor test (ASTM D 1557).

Some manipulation of the moisture content (such as wetting, drying) will be required during the filling operations to obtain the required degree of compaction. The manipulation of the moisture content is highly dependent on weather conditions and site drainage conditions. Therefore, the contractor should prepare both dry and wet fill materials to obtain the specified compaction during

grading. A sufficient number of density tests should be performed to confirm the required compaction of the fill material.

Earthwork Construction Considerations

Shallow excavations for the proposed structures are anticipated to be accomplished with conventional construction equipment. Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to the construction of floor slabs. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Water collecting over, or adjacent to, the construction areas should be removed.

If the subgrade saturates or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompacted prior to floor slab construction. The groundwater table could affect over-excavation efforts, especially for over-excavation and replacement of lower strength soils. A temporary dewatering system consisting of sumps with pumps could be necessary to achieve the recommended depth of over-excavation.

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local, and/or state regulations.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety, or the contractor's activities; such responsibility shall neither be implied nor inferred.

Construction Observation and Testing

The earthwork efforts should be monitored under the direction of the Geotechnical Engineer. Monitoring should include documentation of adequate removal of vegetation and topsoil and mitigation of any areas of weak soil.

Each lift of compacted fill should be tested, evaluated, and reworked, as necessary, until approved by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency provided by the project plan and specifications.

In areas of foundation excavations, the bearing subgrade should be evaluated under the direction of the Geotechnical Engineer. If unanticipated conditions are encountered, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the

continuity to maintain the Geotechnical Engineer’s evaluation of subsurface conditions, including assessing variations and associated design changes.

SLAB OR MAT FOUNDATIONS

The proposed structures can be supported on a slab or mat foundation system, provided that the proposed structure will not exceed the loads as provided in the **Project Description** section. The following sections present design recommendations and construction considerations for the shallow foundations for the proposed structural elements.

Mat Foundation Design Parameters

Item	Description
Mat foundation support	Compacted structural fill/inspected and tested natural ground. ¹
Modulus of subgrade reaction	120 pounds per square inch per in (psi/in) for point loading conditions.
Base course/capillary break ²	6 inches of free-draining granular material.

1. Because the existing ground may have been filled or disturbed previously, we recommend the subgrade be inspected and tested with proofrolling after the topsoil is stripped as outlined in **Earthwork** section.
2. The slab design should include a base course comprised of free-draining, compacted, granular material, at least 4 inches thick. The granular subbase may be graded aggregate base (GAB) or sands containing less than 5 percent fines (material passing the #200 sieve). GAB subbase can also help improve the workability of the subgrade especially during rain periods.

The design bearing pressure may be increased by one-third when considering total loads that include wind or seismic conditions. The weight of the foundation concrete below grade may be neglected in dead load computations.

Foundations should be reinforced as necessary to reduce the potential for the distress caused by differential foundation movement. The use of joints at openings or other discontinuities in masonry walls is recommended.

Foundation excavations should be observed by the Geotechnical Engineer. If the soil conditions encountered differ significantly from those presented in this report, Terracon should be contacted to provide additional evaluation and supplemental recommendations.

Foundation Construction Considerations

The bottom of all foundation excavations should be free of water and loose soil prior to placing concrete. Concrete should be placed soon after excavation to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during construction. Extremely wet or dry material, or any loose or disturbed material in the bottom of the footing

excavations should be removed before concrete is placed. If the soils at bearing level become excessively dry, disturbed or saturated, the affected soils should be removed prior to placing concrete. A lean concrete mud-mat should be placed over the bearing soils if the excavations must remain open overnight or for an extended period of time.

Regarding construction of footings, we generally anticipate suitable material will be present at the bottom of the footings. However, there is a possibility that isolated zones of soft or loose native soils could be encountered below footing bearing level, even though field density tests are expected to be performed during fill placement. Therefore, it is important that Terracon be retained to observe, test, and evaluate the bearing soil prior to placing reinforcing steel and concrete to determine if additional footing excavation or other subgrade repair is needed for the design loads.

If unsuitable bearing soils are encountered in footing excavations, the excavations should be extended deeper to suitable soils and the footings could bear directly on those soils at the lower level or on lean concrete backfill placed in the excavations. As an alternative, the footings could also bear on properly compacted structural backfill extending down to the suitable soils. Over-excavation for compacted backfill placement below footings should extend laterally beyond all edges of the footings at least 8 inches per foot of over excavation depth below footing base elevation.

Depending on the final grade elevation, the over-excavation could encounter the groundwater level. Dewatering of the over-excavation should be planned for and #57 stone is recommended if groundwater is encountered. The over-excavation should then be backfilled up to the foundation base elevation with well-graded granular material placed in lifts of 6 inches or less in loose thickness and compacted to at least 95 percent of the material's maximum dry density as determined by the Standard Proctor test (ASTM D-698).

No. 57 stone is recommended in lieu of structural fill when the volume of excavation is relatively small, re-compaction of the fill is difficult, or the weather conditions or construction schedule becomes a controlling factor.

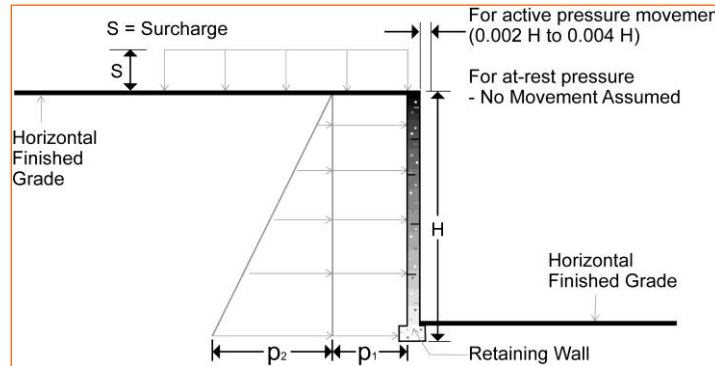
LATERAL EARTH PRESSURES

Design Parameters

The foundation walls with unbalanced backfill levels on opposite sides should be designed for earth pressures at least equal to those indicated in the following table. The earth pressure parameters are recommended based on the structural fills specified in the **Earthwork** section..

Earth pressures will be influenced by the structural design of the walls, conditions of wall restraint, methods of construction and/or compaction and the strength of the materials being restrained. Two wall restraint conditions are shown. Active earth pressure is commonly used for design of

free-standing cantilever retaining walls and assumes wall movement. The "at-rest" condition assumes no wall movement. The recommended design lateral earth pressures do not include a factor of safety or possible hydrostatic pressure on the walls.



Earth Pressure Coefficients (from the structural fill, not insitu soils)

Earth Pressure Conditions	Coefficient for Backfill Type	Equivalent Fluid Density (pcf)	Surcharge Pressure, p_1 (psf)	Earth Pressure, p_2 (psf)
Active (K_a)	Granular - 0.36	42	$(0.36)S$	$(42)H$
At-Rest (K_o)	Granular - 0.53	62	$(0.53)S$	$(62)H$
Passive (K_p)	Granular - 2.77	319	---	---

Applicable conditions to the above include:

- For active earth pressure, wall must rotate about base, with top lateral movements of about $0.002 H$ to $0.004 H$, where H is wall height
- For passive earth pressure to develop, wall must move horizontally against the fill to mobilize resistance
- Uniform surcharge, where S is surcharge pressure
- In situ soil backfill weight a maximum of 115 pcf
- Horizontal backfill, compacted between 95 percent of modified Proctor maximum dry density
- Loading from heavy compaction equipment or dynamic loading not included
- No hydrostatic pressures acting on wall
- No safety factor included in soil parameters

Backfill placed against structures should consist of granular soils. The granular backfill must extend out from the base of the wall at an angle of at least 45 and 60 degrees from vertical for the active

and passive cases, respectively. To calculate the resistance to sliding, a value of 0.32 should be used as the ultimate coefficient of friction between the footing and the underlying soil. We recommend the friction between the soils and sides of grade beams and footings be ignored due to the shallow depth of grade beams and footings.

Depending on the depth of excavation and long-term groundwater conditions, the unbalanced hydrostatic pressure may be considered in the design of the retaining wall. To control hydrostatic pressure behind the wall, we recommend that a drain be installed at the foundation wall with a collection pipe leading to a reliable discharge such as a stormwater drain. If this is not possible, hydrostatic pressure should be added to the lateral earth pressures recommended above. These pressures do not include the influence of surcharge, equipment or floor loading, which should be added.

Heavy equipment should not operate within a distance closer than the exposed height of retaining walls to prevent lateral pressures more than those provided.

SOIL PARAMETERS FOR RETAINING WALL

If drilling or the caisson method is considered instead of the sloped open excavation, temporary retaining structures are required and should be designed for earth pressures. The retaining wall should be designed to resist the lateral earth pressures exerted by the soils behind the wall and the loads adjacent to the wall. The design-build contractor should perform global stability analyses and provide detailed wall design based on the subsurface conditions, loads and performance requirements. If the placement of footings in permanent wall backfill is required, the resulting loads and their effects on the wall should be evaluated by a structural engineer. In order to avoid excessive lateral pressures on the walls, heavy compaction should not be operated within a minimum distance out from the wall, which is typically a distance equal to the height of the wall. The fill-in this zone should be compacted in handheld equipment with thinner lifts.

The retaining walls should be designed for earth pressures equal to those provided in the table below. Earth pressures will be influenced by the structural design of the walls, conditions of wall restraint, methods of construction and/or compaction and the strength of the materials being restrained. Active earth pressure is commonly used for design of free-standing cantilever retaining walls and assumes wall movement. The "at-rest" condition assumes no wall movement. The recommended design lateral earth pressures do not include a factor of safety or possible hydrostatic pressure on the walls. Furthermore, if tieback anchors are used as part of the earth retaining system, the effect of clay layers should be considered in the development of the anchor resistance. These thin clay layers may substantially weaken the resistance and load capacity of the anchors.

Lateral Soil Coefficient at PS3 by Rankine Theory (C01) (for Insitu Soils)

Soil Layer	Depth to Bottom of Stratum, BGS (feet)	Material Type	Unit Weight (pcf)	Active Earth Pressure Coefficient (k_a)	At-Rest Earth Pressure Coefficient (k_o)	Passive Earth Pressure Coefficient (k_p)
1	10	Clay	100	1.0	1.0	1.0
2	18	Clay	120	1.0	1.0	1.0
3	28	Sand	120	0.28	0.44	3.54
4	35	Clay	120	1.0	1.0	1.0

Lateral Soil Coefficient at PS4 by Rankine Theory (C02) (for Insitu soils)

Soil Layer	Depth to Bottom of Stratum, BGS (feet)	Material Type	Unit Weight (pcf)	Active Earth Pressure Coefficient (k_a)	At-Rest Earth Pressure Coefficient (k_o)	Passive Earth Pressure Coefficient (k_p)
1	8	Sand	105	0.31	0.47	3.25
2	18	Clay	100	1.0	1.0	1.0
3	29	Clay	120	1.0	1.0	1.0
4	34	Clay	110	1.0	1.0	1.0

SEISMIC CONSIDERATIONS

According to the International Building Code (IBC) 2018 and ASCE 7-16, structures should be designed and constructed to withstand the effects of earthquakes and avoid failure during a maximum considered earthquake. The maximum considered earthquake (MCE) is a seismic event that has a 50-year exposure period with a 2% probability of exceedance. The 2,500-year earthquake has a Moment Magnitude (M_w) of 7.3 and a Site Class Adjusted Peak Ground Acceleration (PGA_M) of **0.340g**, as determined by data provided by the IBC 2018 and ASCE 7-16 Standards.

Based on our findings from the field exploration and our knowledge of the local geological formation in the project area, the site can be classified as **Site Class D** in accordance with International Building Code (IBC) 2018 and ASCE 7-16. The seismic design parameters obtained based on IBC2018 and ASCE 7-16 are summarized in the table below.

The design response spectrum curve, as presented in **Exhibit C-1**, was developed based on the S_{DS} and S_{D1} values according to IBC2018 and ASCE 7-16.

Summary of Seismic Design Parameters

Site Location (Latitude, Longitude)	Site Classification	S _s	S ₁	F _a	F _v	S _{DS}	S _{D1}
(PS3) 32.4874°, -80.9744°	D	0.448g	0.148g	1.442	2.303	0.430g	0.228g
(PS4) 32.4791°, -80.9728°	D	0.446g	0.148g	1.443	2.304	0.429g	0.227g

- In accordance with the 2018 International Building Code and ASCE 7-16.
- The 2018 IBC and ASCE 7-16 require a site soil profile determination extending a depth of 100 feet for seismic site classification. The current scope does not include 100-foot soil profile determination. Explorations for this project extended to a maximum depth of 35 feet BGS and this seismic site class definition was provided in consideration of the overall soil conditions as well as the general geology of the area.

LIQUEFACTION

We performed a liquefaction potential analysis for the site to evaluate the stability of the soils. Ground shaking at the foundation of structures and liquefaction of the soil under the foundation are the principal seismic hazards identified for the design of earthquake-resistant structures. Our estimates of liquefaction-induced settlements from the geometric mean maximum considered earthquake (MCE_G) are between 1 and 3.5 inches.

Actual liquefaction settlements at the site would be highly dependent on magnitude and distance from the source during the design earthquake event. No special liquefaction mitigation is necessary for the below ground structures unless the designer deems the structures cannot tolerate the risk or survive the effect of the potential liquefaction. .

GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Geotechnical Engineering Report

Ridgeland Pump Stations ■ Ridgeland, South Carolina

January 28, 2022 ■ Terracon Project No. HG215050



Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

EXHIBITS

EXHIBIT A: Exploration Plan and Procedures

EXHIBIT B: Exploration and Testing Results

EXHIBIT C: Supporting Information

EXHIBIT A

EXPLORATION PLAN AND PROCEDURES

- **Exhibit A-1:** Site Location Plan
- **Exhibit A-2:** Exploration Plan
- **Exhibit A-3:** Exploration and Testing Procedures

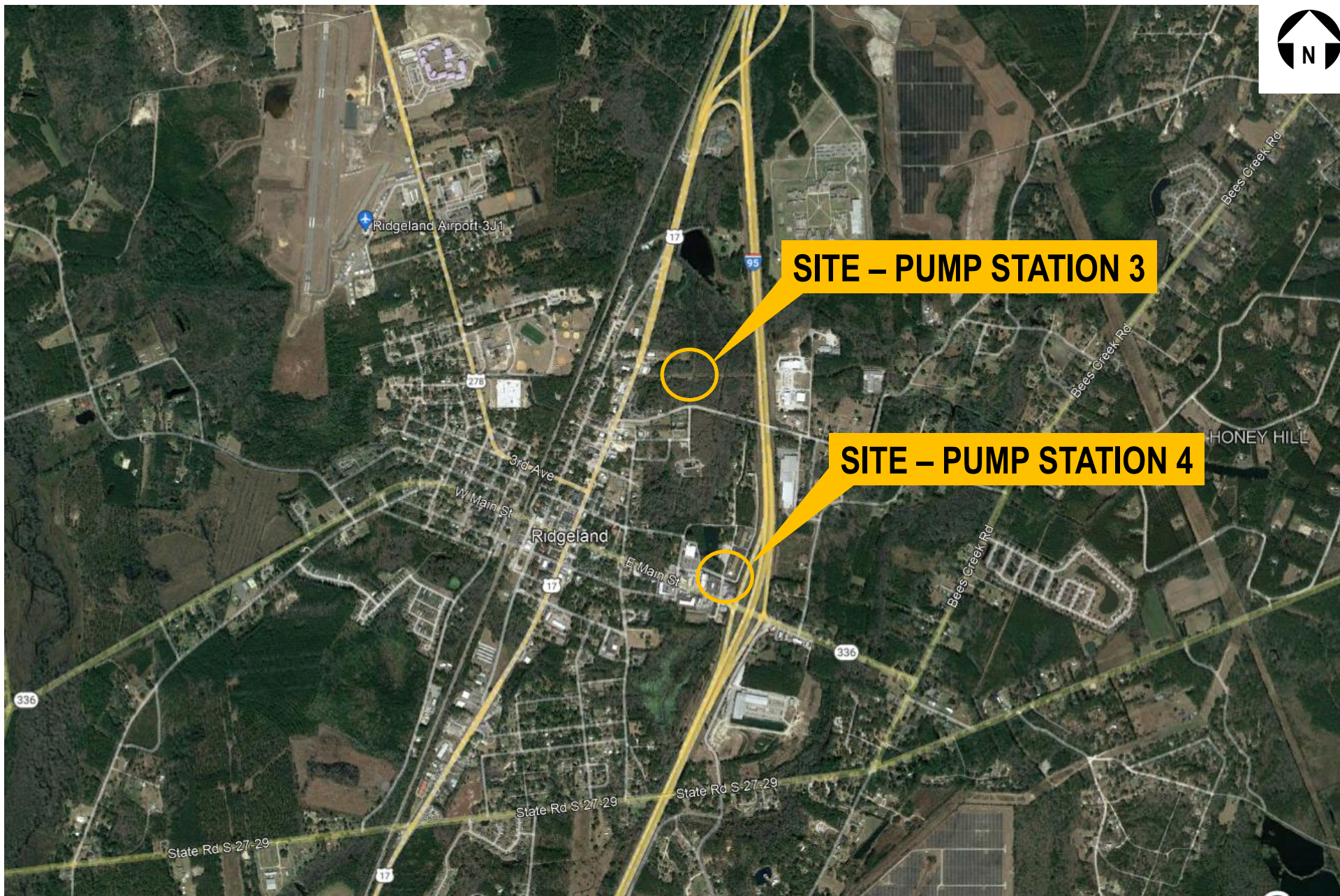


Image Courtesy of Google Earth™

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Approved by:	GL	Date:	1-24-2022

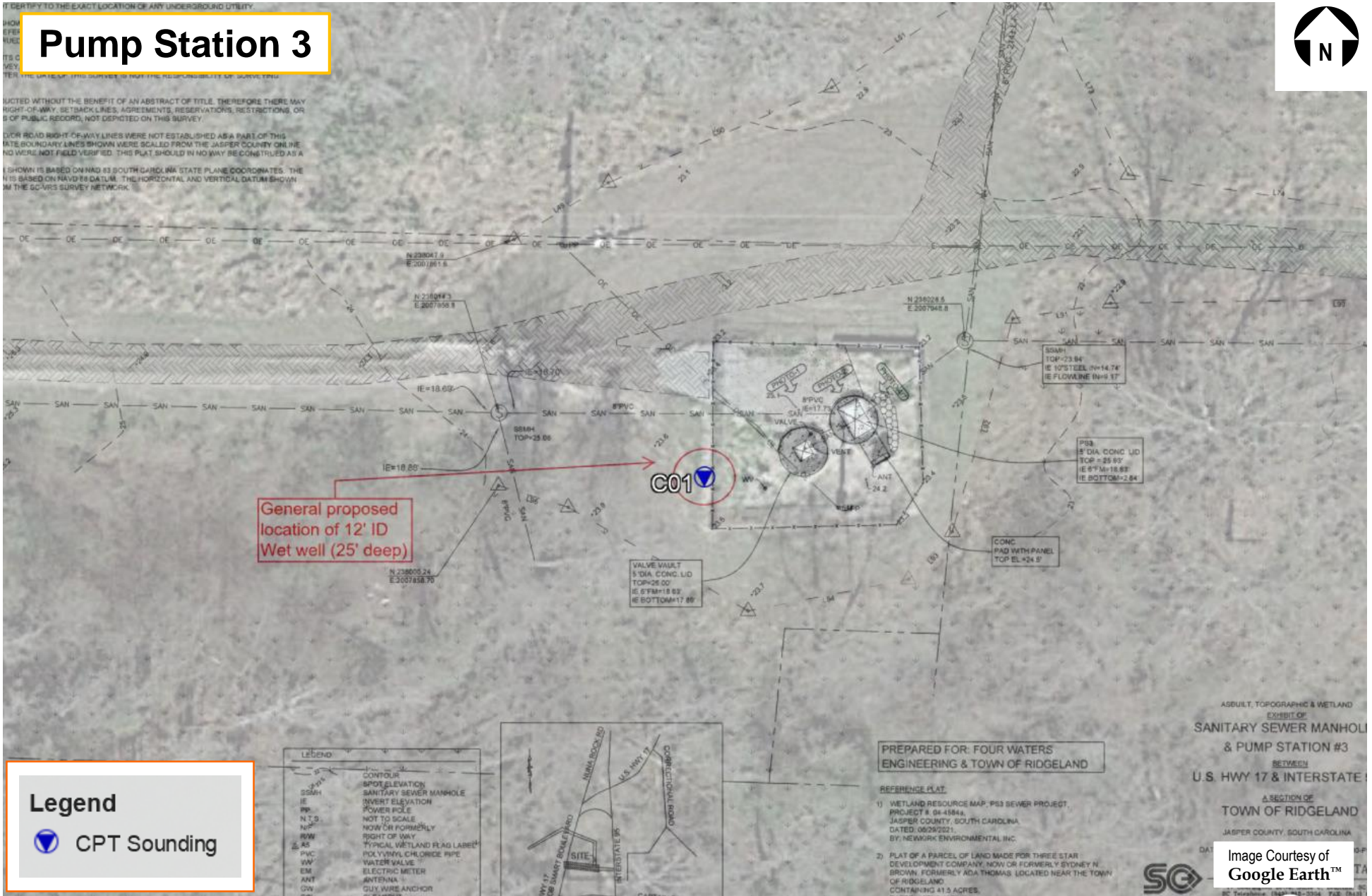
Terracon
Consulting Engineers & Scientists

379 Browns Cove Rd, Site C Ridgeland, South Carolina 29936
Phone (843) 258 7070 Fax (843) 258 7071

SITE LOCATION PLAN
Ridgeland Pump Stations Ridgeland, South Carolina

Exhibit:
A-1

Pump Station 3



Legend

CPT Sounding

Legend	Description
CONTOUR	CONTOUR
SPOT ELEVATION	SPOT ELEVATION
SSMH	SANITARY SEWER MANHOLE
IE	INVERT ELEVATION
PP	POWER POLE
N.T.S.	NOT TO SCALE
NP	NOW OR FORMERLY
ROB	RIGHT OF WAY
AS	TYPICAL WETLAND FLAG LABEL
PVC	POLYVINYL CHLORIDE PIPE
VW	VALVE VAULT
EM	ELECTRIC METER
ANT	ANTENNA
GW	GWY WIRE ANCHOR



PREPARED FOR: FOUR WATERS
ENGINEERING & TOWN OF RIDGELAND

REFERENCE PLAT:
1) WETLAND RESOURCE MAP: P33 SEWER PROJECT, PROJECT # 04-4884, JASPER COUNTY, SOUTH CAROLINA, DATED: 06/29/2021, BY: NETWORK ENVIRONMENTAL INC.
2) PLAT OF A PARCEL OF LAND MADE FOR THREE STAR DEVELOPMENT COMPANY, NOW OR FORMERLY SYDNEY N. BROWN, FORMERLY ADA THOMAS, LOCATED NEAR THE TOWN OF RIDGELAND, SOUTH CAROLINA, CONTAINING 41.5 ACRES.

ASBUILT, TOPOGRAPHIC & WETLAND
EXHIBIT OF
SANITARY SEWER MANHOLE
& PUMP STATION #3
BETWEEN
U.S. HWY 17 & INTERSTATE 17
A SECTION OF
TOWN OF RIDGELAND
JASPER COUNTY, SOUTH CAROLINA

Image Courtesy of Google Earth™

NOTES:
CONCEPTUAL PLANS PROVIDED TO TERRACON BY FOUR WATERS ENGINEERING VIA EMAIL ON 10-29-2021.
ALL EXPLORATION LOCATIONS WERE LOCATED IN THE FIELD USING A GPS UNIT AND / OR SITE LANDMARKS. EXPLORATION LOCATIONS SHOULD BE CONSIDERED APPROXIMATE. DIAGRAM IS FOR GENERAL LOCATION ONLY; NOT INTENDED FOR CONSTRUCTION PURPOSES.

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Checked by:	GL	File Name:	
Approved by:	GL	Date:	1-24-2022

Terracon
Consulting Engineers & Scientists

379 Browns Cove Rd, Ste C Ridgeland, South Carolina 29936
Phone (843) 258 7070 Fax (843) 258 7071

EXPLORATION PLAN

Ridgeland Pump Stations
Ridgeland, South Carolina

Exhibit:
A-2-1

Pump Station 4



ADDRESS:
#123 JAMES F. TAYLOR DRIVE
PARENT TAX PARCEL I.D. NO. 063-31-02-009

PREPARED FOR: FOUR WATERS
ENGINEERING & TOWN OF RIDGELAND

General location of
proposed PS4 wet
well (8" ID, 21'
deep)

PS4
17" DIAMETER CONC. LID
TOP = 33.51'
IE BOTTOM = 14.83'

VALVE VAULT
TOP = 39.95'
IE BOTTOM = 29.79'

C02

CENTER OF PS4 LID
N: 234876.88
E: 2008420.48

REFERENCE PLAT
A TOPOGRAPHIC SURVEY ALONG A PORTION OF JAMES
TAYLOR DRIVE, TOWN OF RIDGELAND, JASPER COUNTY, SC.
DATED: 11/17/2017
BY: THOMAS S. STANLEY & C.R.L.S. NO. 18289
TGS LAND SURVEYING

SPECIAL NOTE
*HORIZONTAL DATUM IS NAD 83 SOUTH CAROLINA STATE PLANE COORDINATES
*VERTICAL DATUM IS NAVD 83
*SEE NOTE #6 BELOW

NOTES
1. I HEREBY STATE THAT TO THE BEST OF MY KNOWLEDGE, INFORMATION, AND BELIEF, THE SURVEY SHOWN HEREIN WAS MADE IN ACCORDANCE WITH THE REQUIREMENTS OF THE MINIMUM STANDARDS MANUAL FOR THE PRACTICE OF LAND SURVEYING IN SOUTH CAROLINA, AND MEETS OR EXCEEDS THE REQUIREMENTS FOR A CLASS "A" SURVEY AS SPECIFIED THEREIN; ALSO THERE ARE NO OBVIOUS, APPARENT OR VISIBLE ENCROACHMENTS OF PROJECTIONS OTHER THAN SHOWN

SHOWN AND ARE NOT CERTIFY TO THE EXACT
THAT OUR WETLAND SURVEYS
THIS PLAT DOES NOT REFLECT
CONTAMINATION, OR OTHER
DARY, TOPOGRAPHIC AND
IE DATE OF SURVEY. IF THIS
OTHERS, INFORMATION
IS RESPONSIBILITY OF

SG SURVEYING CO
17 Sherrington Drive, Suite E
SC Telephone: (843) 863-3366
GA Telephone: (918)
www.SurveyingCo.com
Email: SC@SurveyingCo.com

PREPARED FOR:
FOUR WATERS ENGINEERING & TOWN

LEGEND:

TREE SIZES ARE INCHES IN DIA

+	SPOT ELEVAT
PLM	PALME TTO
EM	ELECTRIC ME
GI	GRATE INLET
IE	INVERT ELEV
LP	LAND POLE
NFS	NOT TO SCAL
NF	NOW OR FOR
RW	RIGHT OF WA
DV	DITCH
SSMH	SANITARY SE
WM	WATER METE
WV	WATER VALV
PVC	POLYVINYL C
SAN	SANITARY SE

Legend
CPT Sounding

Image Courtesy of
Google Earth™

NOTES:
CONCEPTUAL PLANS PROVIDED TO TERRACON BY FOUR WATERS ENGINEERING VIA EMAIL ON 10-29-2021.
ALL EXPLORATION LOCATIONS WERE LOCATED IN THE FIELD USING A GPS UNIT AND / OR SITE LANDMARKS. EXPLORATION LOCATIONS SHOULD BE CONSIDERED APPROXIMATE. DIAGRAM IS FOR GENERAL LOCATION ONLY; NOT INTENDED FOR CONSTRUCTION PURPOSES.

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Approved by:	GL		1-24-2022

Terracon
Consulting Engineers & Scientists

379 Browns Cove Rd, Ste C Ridgeland, South Carolina 29936
Phone (843) 258 7070 Fax (843) 258 7071

EXPLORATION PLAN

Ridgeland Pump Stations
Ridgeland, South Carolina

Exhibit:
A-2-2

EXHIBIT A-3 - EXPLORATION & TESTING PROCEDURES

Ridgeland Pump Stations ■ Ridgeland, South Carolina
January 24, 2022 ■ Terracon Project No. HG215050



Field Exploration

No. of Test	Type of Test	Location	Maximum Depth (feet, below ground surface)
1	Cone Penetration Test (CPT) Sounding	PS3	35
1	Cone Penetration Test (CPT) Sounding	PS4	34

Boring Layout and Elevations: Unless otherwise noted, Terracon personnel provided the boring layout. Coordinates were obtained with a handheld GPS unit (estimated horizontal accuracy of about ± 10 feet).

Subsurface Exploration Procedures:

CPT soundings were performed in accordance with ASTM D5778. In the CPT soundings, an electronically instrumented cone penetrometer is hydraulically pushed through the soil to measure tip stress, sleeve friction and pore water pressure. The CPT data can be used to determine soil stratigraphy and to estimate soil parameters such as undrained shear strength and modulus of compression.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples.

EXHIBIT B

EXPLORATION AND TESTING RESULTS

- **Exhibit B-1:** Subsurface Profile
- **Exhibit B-2:** CPT Sounding Logs

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. 11X17 CPT FENCE HG215050 RIDGELAND PUMP ST.GPJ TERRACON_DATATEMPLATE.GDT 12/20/21



Explanation

- Moisture Content — %w C1 — Borehole Number
- Sampling — LL PL — Liquid and Plastic Limits
- AR — Borehole Lithology
- BT — Borehole Termination Type
- Water Level Reading at time of drilling.
- Water Level Reading after drilling.

NOTES:
 See Exhibit for orientation of soil profile.
 See General Notes in Appendix for symbols and soil classifications.
 Soils profile provided for illustration purposes only.
 Soils between borings may differ.
 AR - Auger Refusal
 BT - Boring Termination

Project Manager: MB
Drawn by: MB
Approved by: GL
Date: 12/20/2021

Project No.: HG215050
Scale: N.T.S.
File Name: HG215050

Terracon

379 Browns Cove Rd Ste C
Ridgeland, SC

PH. 843-258-7070 FAX.

SUBSURFACE PROFILE

RIDGELAND PUMP STATIONS
N JACOB SMART BLVD
RIDGELAND, SC

EXHIBIT
B-1

CPT LOG NO. C01

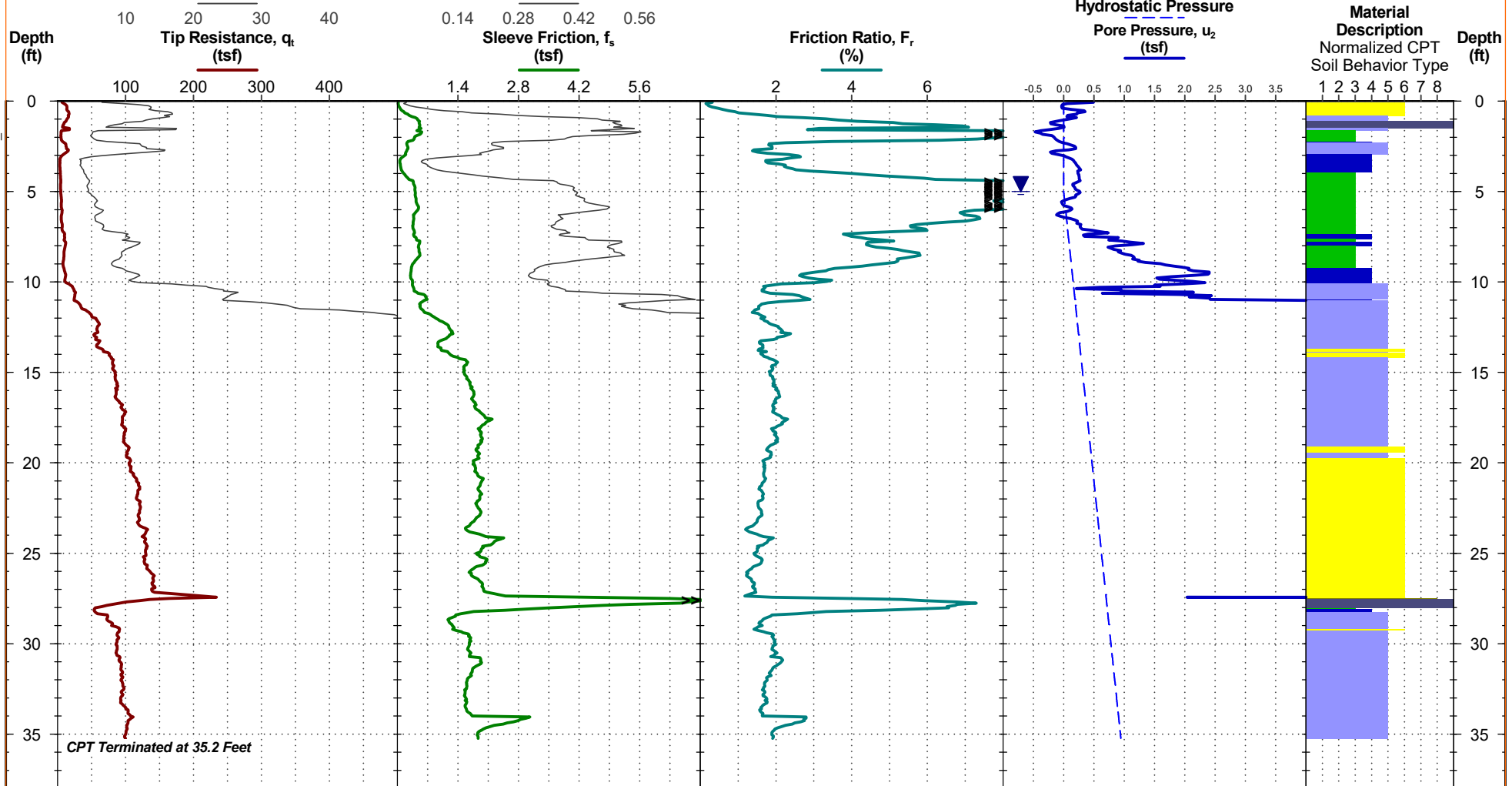
PROJECT: Ridgeland Pump Stations

CLIENT: Four Waters Engineering, Inc.
Jacksonville Beach, FL

TEST LOCATION: See [Exploration Plan](#)

SITE: N Jacob Smart Blvd
Ridgeland, SC

Latitude: 32.4874°
Longitude: -80.9744°



See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

CPT sensor calibration reports available upon request.

- 1 Sensitive, fine grained
- 2 Organic soils - clay
- 3 Clay - silty clay to clay
- 4 Silt mixtures - clayey silt to silty clay
- 5 Sand mixtures - silty sand to sandy silt
- 6 Sands - clean sand to silty sand
- 7 Gravelly sand to dense sand
- 8 Very stiff sand to clayey sand
- 9 Very stiff fine grained

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT HG215050 RIDGELAND PUMP ST.GPJ TERRACON_DATA TEMPLATE.GDT 12/20/21

WATER LEVEL OBSERVATION

▼ 5 ft measured water depth
(used in normalizations and correlations;
See [Supporting Information](#))

Probe no. 5008 with net area ratio of .83
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 6/3/2021
Tip and sleeve areas of 15 cm² and 225 cm²
Ring friction reducer with O.D. of 2 in



CPT Started: 12/17/2021

Rig: Geoprobe

Project No.: HG215050

CPT Completed: 12/17/2021

Operator: BR

Exhibit B-2-1

CPT LOG NO. C02

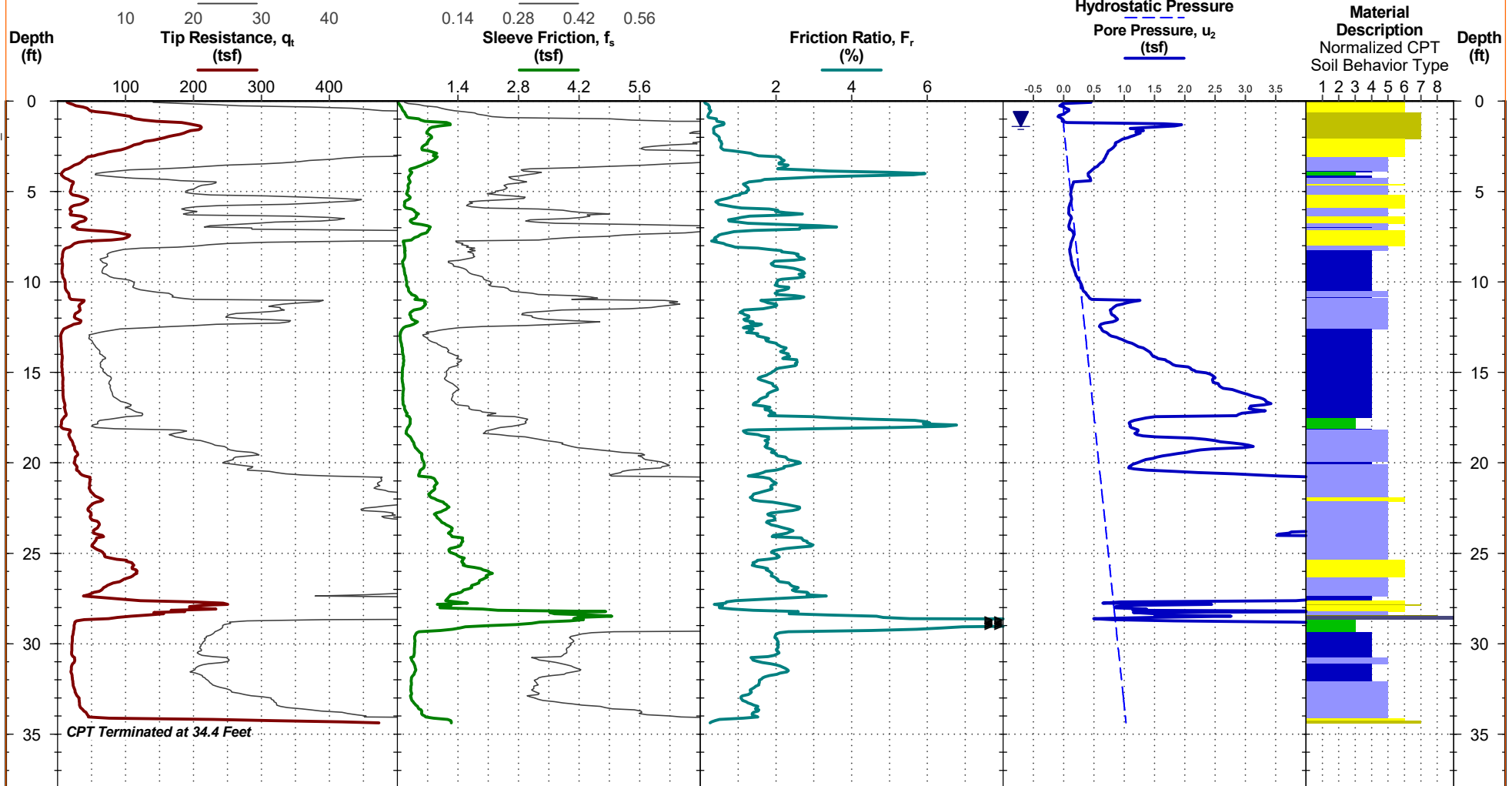
PROJECT: Ridgeland Pump Stations

CLIENT: Four Waters Engineering, Inc.
Jacksonville Beach, FL

TEST LOCATION: See [Exploration Plan](#)

SITE: N Jacob Smart Blvd
Ridgeland, SC

Latitude: 32.4791°
Longitude: -80.9728°



See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

CPT sensor calibration reports available upon request.

- 1 Sensitive, fine grained
- 2 Organic soils - clay
- 3 Clay - silty clay to clay
- 4 Silt mixtures - clayey silt to silty clay
- 5 Sand mixtures - silty sand to sandy silt
- 6 Sands - clean sand to silty sand
- 7 Gravelly sand to dense sand
- 8 Very stiff sand to clayey sand
- 9 Very stiff fine grained

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT HG215050 RIDGELAND PUMP ST.GPJ TERRACON_DATA TEMPLATE.GDT 12/20/21

WATER LEVEL OBSERVATION

▼ 1.4 ft measured water depth
(used in normalizations and correlations;
See [Supporting Information](#))

Probe no. 5008 with net area ratio of .83
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 6/3/2021
Tip and sleeve areas of 15 cm² and 225 cm²
Ring friction reducer with O.D. of 2 in



CPT Started: 12/17/2021

Rig: Geoprobe

Project No.: HG215050

CPT Completed: 12/17/2021

Operator: BR

Exhibit B-2-2

EXHIBIT C

SUPPORTING INFORMATION

- **Exhibit C-1:** Seismic Design Parameters
- **Exhibit C-2:** Liquefaction Analysis
- **Exhibit C-3:** CPT General Notes
- **Exhibit C-4:** General Notes
- **Exhibit C-5:** Unified Soil Classification System

Seismic Design Parameters Based on IBC2018 Code and ASCE 7-16 Standard



Terracon Project Name: Ridgeland Pump Stations
 Terracon Project No: HG215050

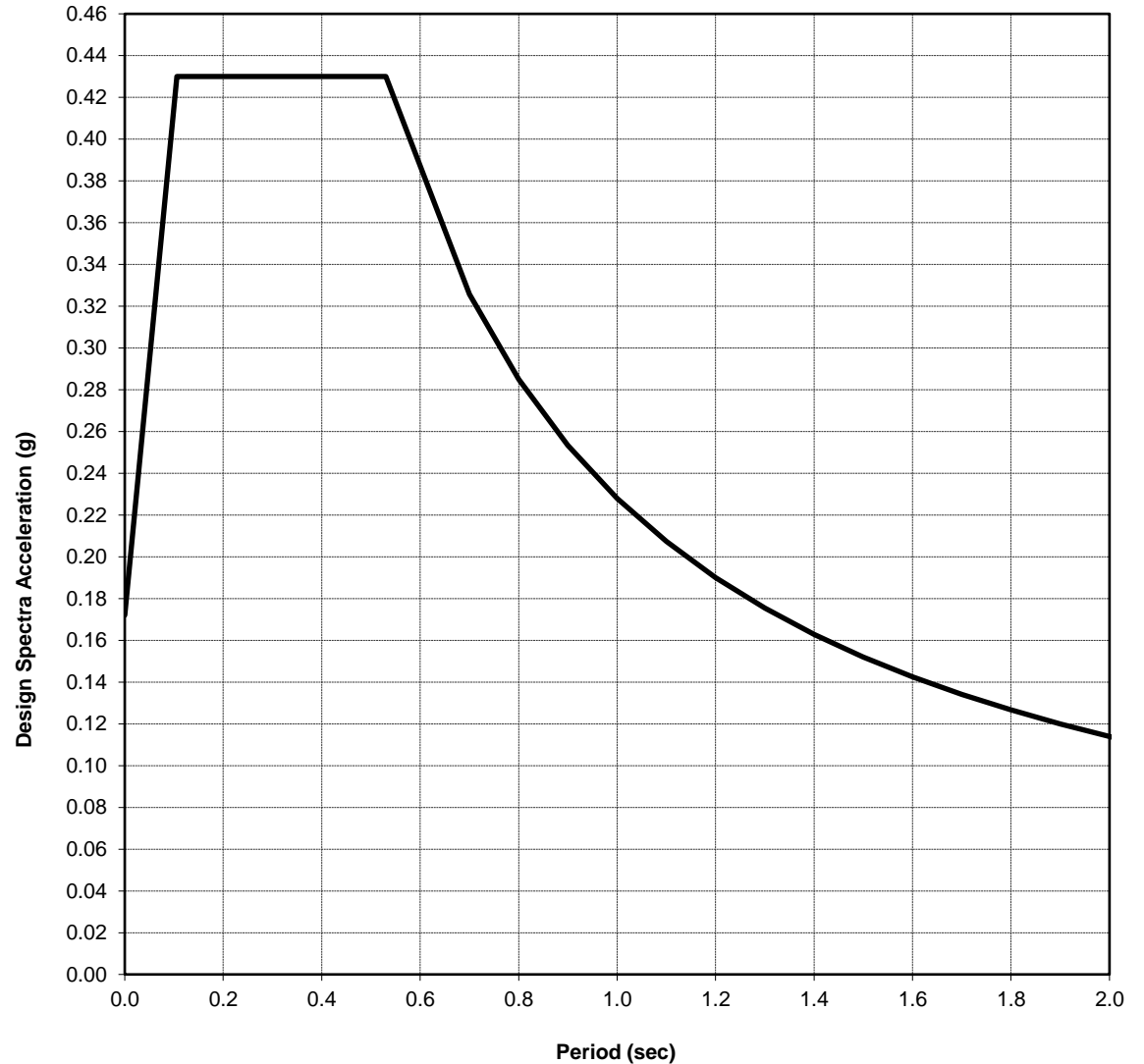
Site Location: Ridgeland, South Carolina (Pump Station 3)
 Latitude : 32.4874°
 Longitude : -80.9744°

Site Class: D

Design Response Spectrum for the Site Class

$S_s = 0.448$	$S_1 = 0.148$
$F_a = 1.442$	$F_v = 2.303$
$S_{MS} = 0.645$	$S_{M1} = 0.342$
$S_{DS} = 0.430$	$S_{D1} = 0.228$

	Period (sec)	Sa (g)
	0.000	0.172
$T_0 =$	0.106	0.430
	0.200	0.430
$T_s =$	0.530	0.430
$T =$	0.700	0.326
	0.800	0.285
	0.900	0.253
	1.000	0.228
	1.100	0.207
	1.200	0.190
	1.300	0.175
	1.400	0.163
	1.500	0.152
	1.600	0.143
	1.700	0.134
	1.800	0.127
	1.900	0.120
	2.000	0.114
	2.100	0.109



Seismic Design Parameters Based on IBC2018 Code and ASCE 7-16 Standard



Terracon Project Name: Ridgeland Pump Stations
 Terracon Project No: HG215050

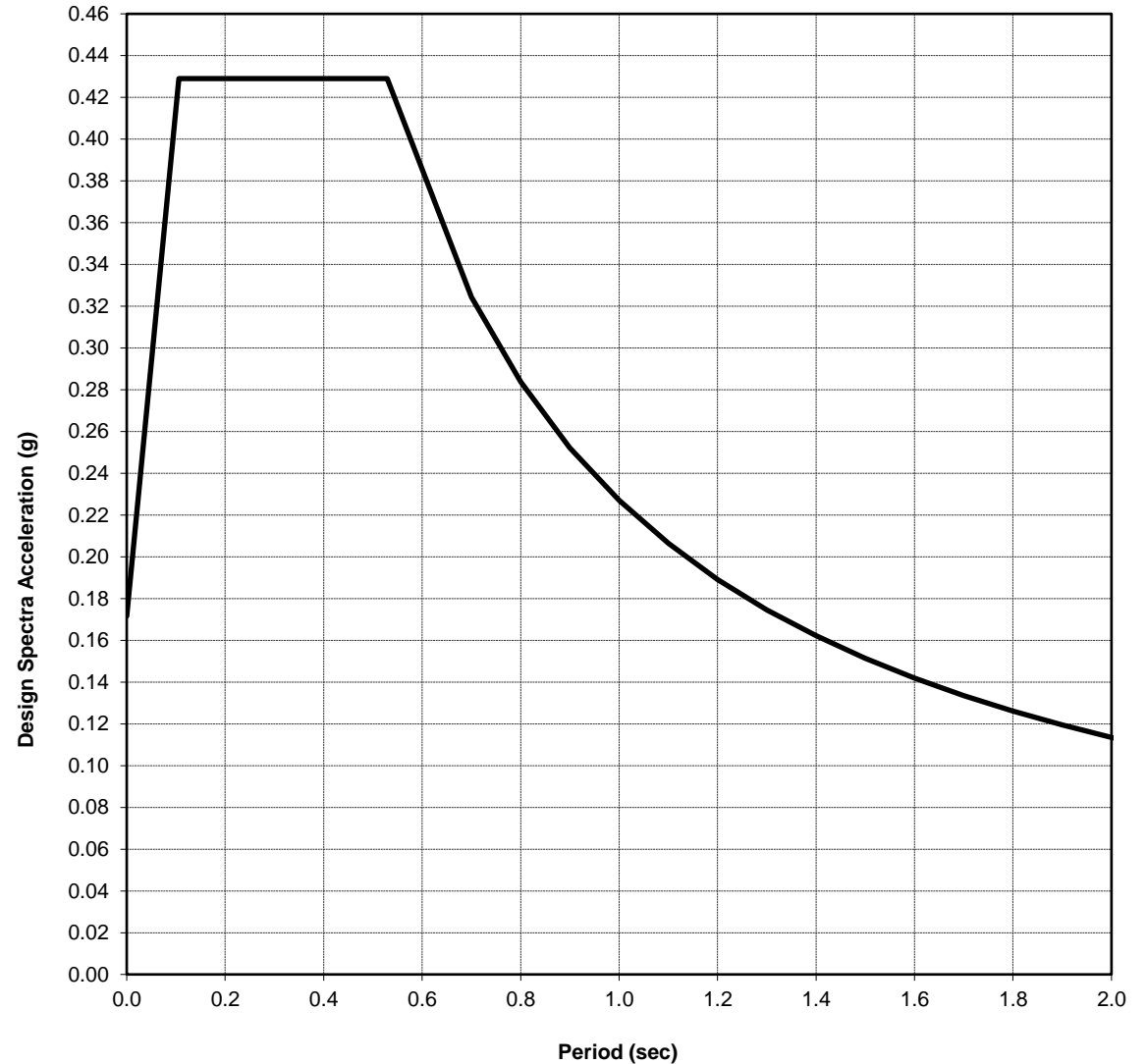
Site Location: Ridgeland, South Carolina (Pump Station 4)
 Latitude : 32.4791°
 Longitude : -80.9728°

Site Class: D

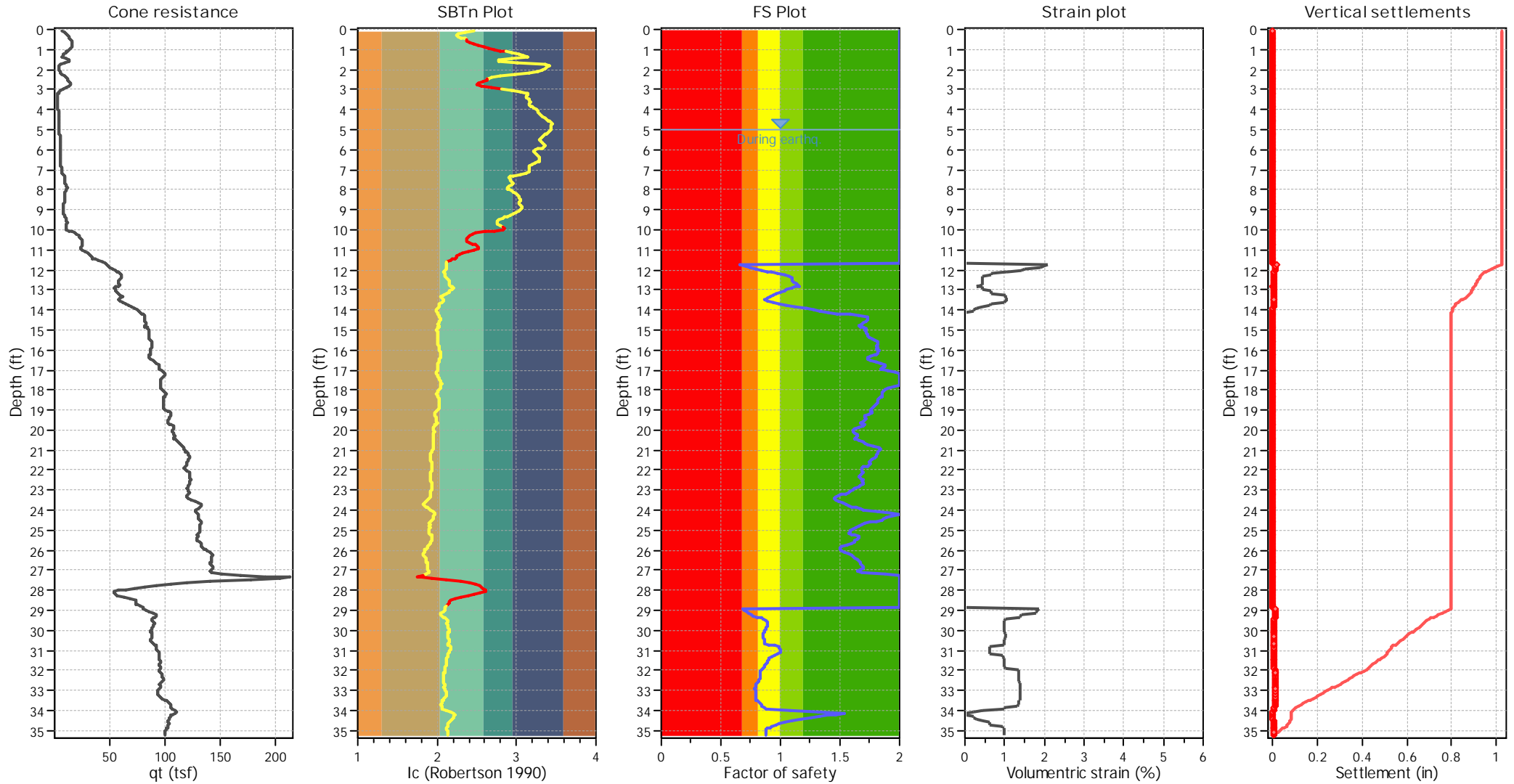
Design Response Spectrum for the Site Class

$S_s = 0.446$	$S_1 = 0.148$
$F_a = 1.443$	$F_v = 2.304$
$S_{MS} = 0.644$	$S_{M1} = 0.341$
$S_{DS} = 0.429$	$S_{D1} = 0.227$

	Period (sec)	Sa (g)
	0.000	0.172
$T_0 =$	0.106	0.429
	0.200	0.429
$T_S =$	0.529	0.429
$T =$	0.700	0.324
	0.800	0.284
	0.900	0.252
	1.000	0.227
	1.100	0.206
	1.200	0.189
	1.300	0.175
	1.400	0.162
	1.500	0.151
	1.600	0.142
	1.700	0.134
	1.800	0.126
	1.900	0.119
	2.000	0.114
	2.100	0.108



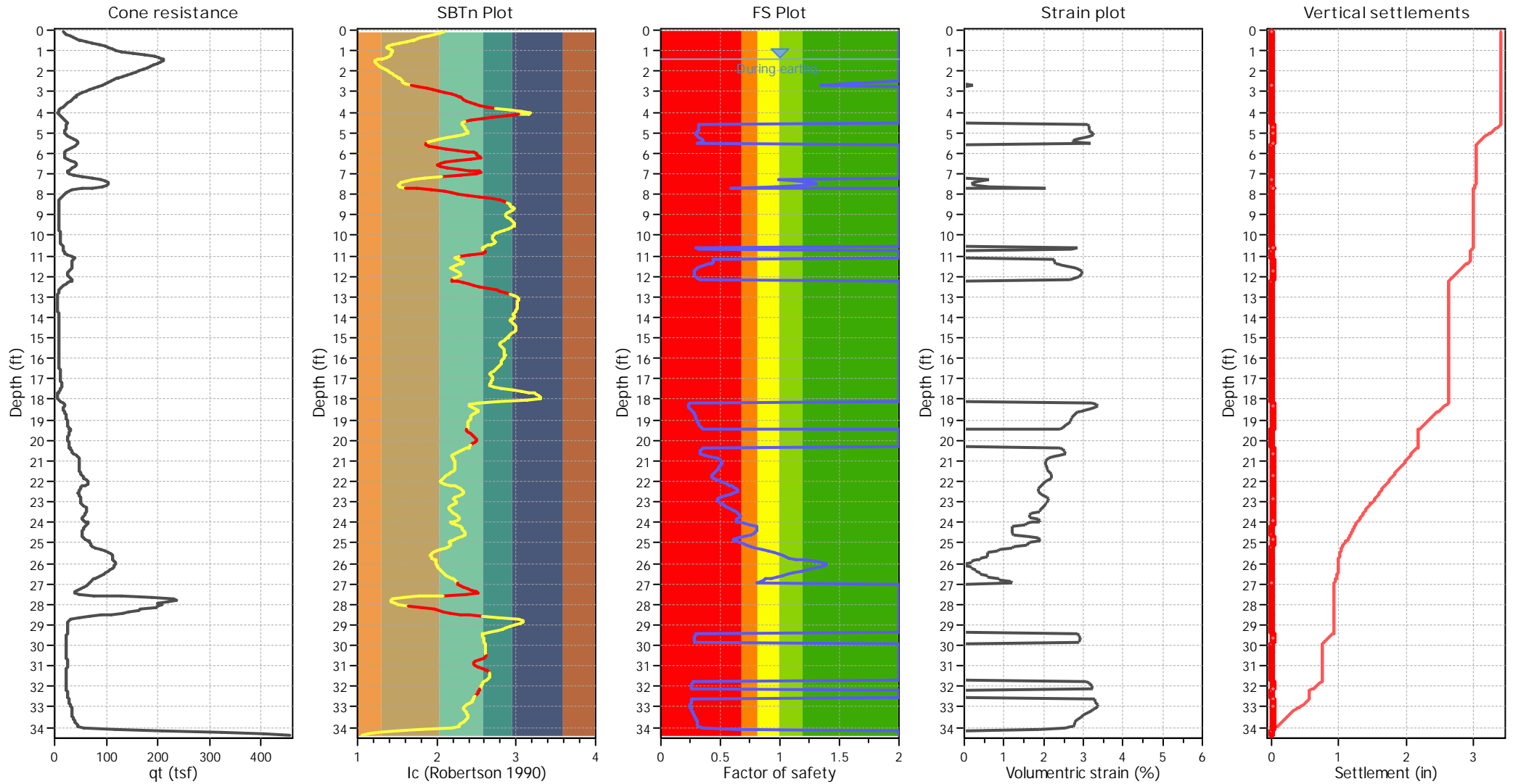
Estimation of post-earthquake settlements



Abbreviations

- qt: Total cone resistance (cone resistance q_c corrected for pore water effects)
- I_c: Soil Behaviour Type Index
- FS: Calculated Factor of Safety against liquefaction
- Volumetric strain: Post-liquefaction volumetric strain

Estimation of post-earthquake settlements



Abbreviations

- qt: Total cone resistance (cone resistance q_c corrected for pore water effects)
- I_c : Soil Behaviour Type Index
- FS: Calculated Factor of Safety against liquefaction
- Volumetric strain: Post-liquefaction volumetric strain

CPT GENERAL NOTES

DESCRIPTION OF MEASUREMENTS AND CALIBRATIONS

To be reported per ASTM D5778:

Uncorrected Tip Resistance, q_c
Measured force acting on the cone divided by the cone's projected area

Corrected Tip Resistance, q_t
Cone resistance corrected for porewater and net area ratio effects
 $q_t = q_c + U2(1 - a)$

Where a is the net area ratio, a lab calibration of the cone typically between 0.70 and 0.85

Pore Pressure, U1/U2
Pore pressure generated during penetration
U1 - sensor on the face of the cone
U2 - sensor on the shoulder (more common)

Sleeve Friction, f_s
Frictional force acting on the sleeve divided by its surface area

Normalized Friction Ratio, FR
The ratio as a percentage of f_s to q_t , accounting for overburden pressure

To be reported per ASTM D7400, if collected:

Shear Wave Velocity, V_s
Measured in a Seismic CPT and provides direct measure of soil stiffness

DESCRIPTION OF GEOTECHNICAL CORRELATIONS

Normalized Tip Resistance, Q_t
 $Q_t = (q_t - \sigma_{v0}) / \sigma'_{v0}$

Over Consolidation Ratio, OCR
OCR (1) = $0.25(Q_t)^{1.25}$
OCR (2) = $0.33(Q_t)$

Undrained Shear Strength, S_u
 $S_u = Q_t \times \sigma'_{v0} / N_{60}$
 N_{60} is a geographical factor (shown on S_u plot)

Sensitivity, St
 $St = (q_t - \sigma_{v0} / N_{60}) \times (1 / fs)$

Effective Friction Angle, ϕ'
 $\phi' (1) = \tan^{-1}(0.373[\log(q_t / \sigma'_{v0}) + 0.29])$
 $\phi' (2) = 17.6 + 11[\log(Q_t)]$

Unit Weight
 $UW = (0.27[\log(FR)] + 0.36[\log(q_t / atm)] + 1.236) \times UW_{water}$
 σ_{v0} is taken as the incremental sum of the unit weights

SPT N_{60}
 $N_{60} = (q_t / atm) / 10^{(1.1268 - 0.2817k)}$

Soil Behavior Type Index, I_c
 $I_c = [(3.47 - \log(Q_t))^2 + (\log(FR) + 1.22)^2]^{0.5}$

Small Strain Modulus, G_0
 $G_0 = \rho V_s^2$

Elastic Modulus, E_s (assumes $q/q_{ultimate} \sim 0.3$, i.e. FS = 3)
 $E_s (1) = 2.6\psi G_0$
where $\psi = 0.56 - 0.33\log Q_{t, clean\ sand}$
 $E_s (2) = G_0$
 $E_s (3) = 0.015 \times 10^{(0.55I_c + 1.68)} (q_t - \sigma_{v0})$
 $E_s (4) = 2.5q_t$

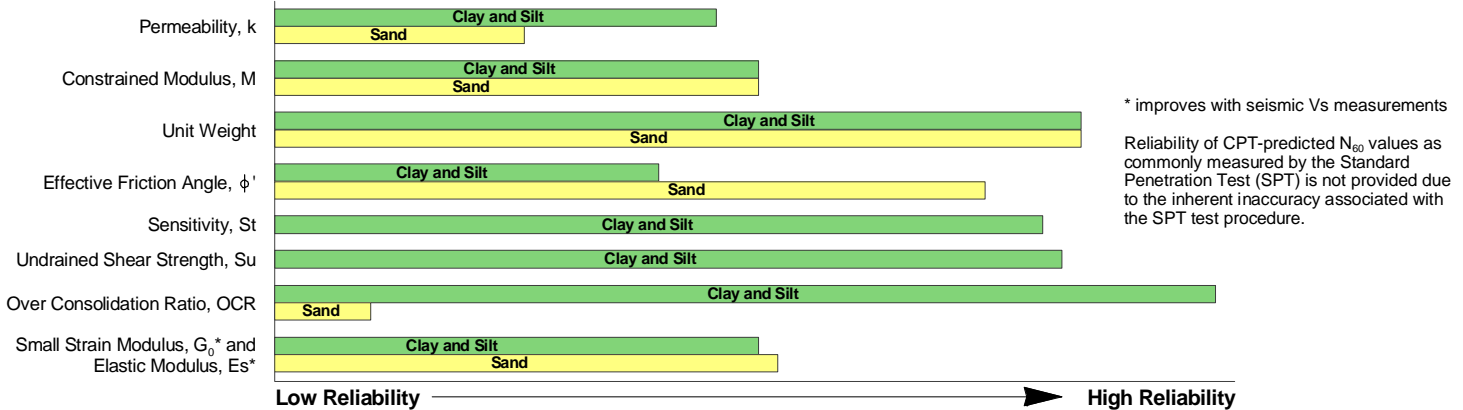
Constrained Modulus, M
 $M = \alpha_M (q_t - \sigma_{v0})$
For $I_c > 2.2$ (fine-grained soils)
 $\alpha_M = Q_t$ with maximum of 14
For $I_c < 2.2$ (coarse-grained soils)
 $\alpha_M = 0.0188 \times 10^{(0.55I_c + 1.68)}$

Hydraulic Conductivity, k
For $1.0 < I_c < 3.27$ $k = 10^{(0.952 - 3.04I_c)}$
For $3.27 < I_c < 4.0$ $k = 10^{(-4.52 - 1.37I_c)}$

REPORTED PARAMETERS

CPT logs as provided, at a minimum, report the data as required by ASTM D5778 and ASTM D7400 (if applicable). This minimum data include tip resistance, sleeve resistance, and porewater pressure. Other correlated parameters may also be provided. These other correlated parameters are interpretations of the measured data based upon published and reliable references, but they do not necessarily represent the actual values that would be derived from direct testing to determine the various parameters. The following chart illustrates estimates of reliability associated with correlated parameters based upon the literature referenced below.

RELATIVE RELIABILITY OF CPT CORRELATIONS



WATER LEVEL

The groundwater level at the CPT location is used to normalize the measurements for vertical overburden pressures and as a result influences the normalized soil behavior type classification and correlated soil parameters. The water level may either be "measured" or "estimated."

Measured - Depth to water directly measured in the field

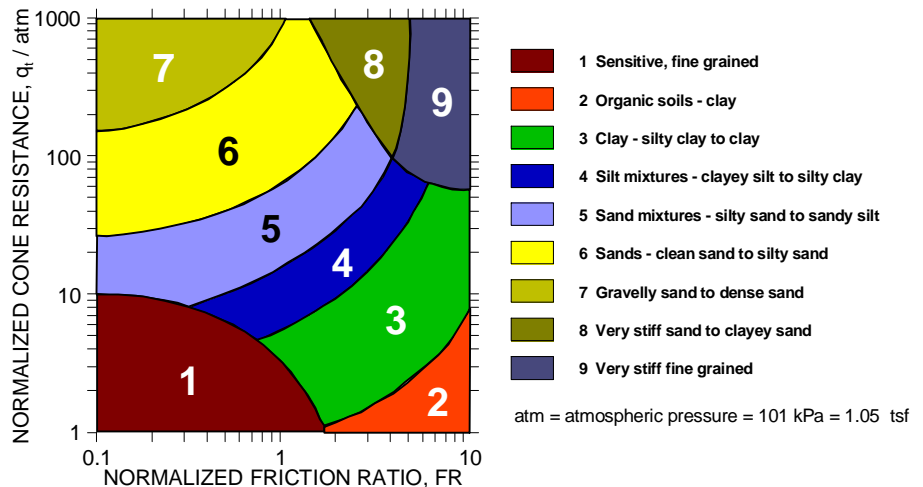
Estimated - Depth to water interpolated by the practitioner using pore pressure measurements in coarse grained soils and known site conditions

While groundwater levels displayed as "measured" more accurately represent site conditions at the time of testing than those "estimated," in either case the groundwater should be further defined prior to construction as groundwater level variations will occur over time.

CONE PENETRATION SOIL BEHAVIOR TYPE

The estimated stratigraphic profiles included in the CPT logs are based on relationships between corrected tip resistance (q_t), friction resistance (f_s), and porewater pressure (U2). The normalized friction ratio (FR) is used to classify the soil behavior type.

Typically, silts and clays have high FR values and generate large excess penetration porewater pressures; sands have lower FRs and do not generate excess penetration porewater pressures. Negative pore pressure measurements are indicative of fissured fine-grained material. The adjacent graph (Robertson et al.) presents the soil behavior type correlation used for the logs. This normalized SBT chart, generally considered the most reliable, does not use pore pressure to determine SBT due to its lack of repeatability in onshore CPTs.



REFERENCES

- Kulhawy, F.H., Mayne, P.W., (1997). "Manual on Estimating Soil Properties for Foundation Design," Electric Power Research Institute, Palo Alto, CA.
- Mayne, P.W., (2013). "Geotechnical Site Exploration in the Year 2013," Georgia Institute of Technology, Atlanta, GA.
- Robertson, P.K., Cabal, K.L. (2012). "Guide to Cone Penetration Testing for Geotechnical Engineering," Signal Hill, CA.
- Schmertmann, J.H., (1970). "Static Cone to Compute Static Settlement over Sand," *Journal of the Soil Mechanics and Foundations Division*, 96(SM3), 1011-1043.

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING		Auger	GROUNDWATER		Groundwater Initially Encountered	FIELD TESTS	(HP)	Hand Penetrometer	
		Split Spoon			Groundwater Level After a Specified Period of Time		(T)	Torvane	
		Shelby Tube			Static Groundwater Level After a Specified Period of Time		(b/f)	Standard Penetration Test (blows per foot)	
		Macro Core			No Groundwater Observed		(PID)	Photo-Ionization Detector	
		No Recovery		Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.			(OVA)	Organic Vapor Analyzer	
		Rock Core							
		Ring Sampler							

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS	RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance Includes gravels, sands and silts.		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
	Descriptive Term (Density)	Std. Penetration Resistance (blows per foot)	Descriptive Term (Consistency)	Undrained Shear Strength (kips per square foot)	Std. Penetration Resistance (blows per foot)
	Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
	Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
	Medium Dense	10 - 29	Medium-Stiff	0.50 to 1.00	5 - 7
	Dense	30 - 50	Stiff	1.00 to 2.00	8 - 14
	Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	above 4.00	> 30	

RELATIVE PROPORTIONS OF SAND AND GRAVEL

<u>Descriptive Term(s) of other constituents</u>	<u>Percent of Dry Weight</u>
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

<u>Descriptive Term(s) of other constituents</u>	<u>Percent of Dry Weight</u>
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

<u>Descriptive Term(s) of other constituents</u>	<u>Percent of Dry Weight</u>
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

<u>Term</u>	<u>Plasticity Index</u>
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A				Soil Classification						
				Group Symbol	Group Name ^B					
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines ^C	Cu ³ 4 and 1 £ Cc £ 3 ^E	GW	Well-graded gravel ^F					
			Cu < 4 and/or [Cc<1 or Cc>3.0] ^E	GP	Poorly graded gravel ^F					
		Gravels with Fines: More than 12% fines ^C	Fines classify as ML or MH	GM	Silty gravel ^{F, G, H}					
			Fines classify as CL or CH	GC	Clayey gravel ^{F, G, H}					
	Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands: Less than 5% fines ^D	Cu ³ 6 and 1 £ Cc £ 3 ^E	SW	Well-graded sand ^I					
			Cu < 6 and/or [Cc<1 or Cc>3.0] ^E	SP	Poorly graded sand ^I					
		Sands with Fines: More than 12% fines ^D	Fines classify as ML or MH	SM	Silty sand ^{G, H, I}					
			Fines classify as CL or CH	SC	Clayey sand ^{G, H, I}					
Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silts and Clays: Liquid limit less than 50	Inorganic:	PI > 7 and plots on or above "A"	CL	Lean clay ^{K, L, M}					
			PI < 4 or plots below "A" line ^J	ML	Silt ^{K, L, M}					
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay ^{K, L, M, N}				
			Liquid limit - not dried			Organic silt ^{K, L, M, O}				
	Silts and Clays: Liquid limit 50 or more	Inorganic:	PI plots on or above "A" line	CH	Fat clay ^{K, L, M}					
			PI plots below "A" line	MH	Elastic Silt ^{K, L, M}					
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay ^{K, L, M, P}				
			Liquid limit - not dried			Organic silt ^{K, L, M, Q}				
			Highly organic soils:			Primarily organic matter, dark in color, and organic odor		PT	Peat	

^A Based on the material passing the 3-inch (75-mm) sieve.

^B If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^C Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^D Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

$$E \text{ Cu} = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

^F If soil contains ³ 15% sand, add "with sand" to group name.

^G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^H If fines are organic, add "with organic fines" to group name.

^I If soil contains ³ 15% gravel, add "with gravel" to group name.

^J If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^L If soil contains ³ 30% plus No. 200 predominantly sand, add "sandy" to group name.

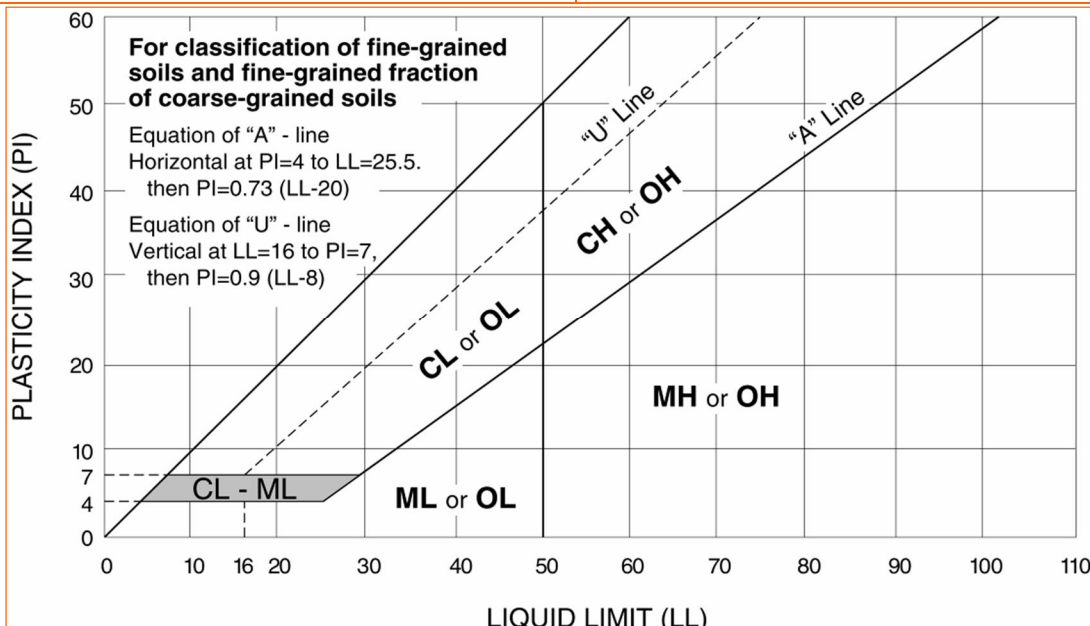
^M If soil contains ³ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

^N PI ³ 4 and plots on or above "A" line.

^O PI < 4 or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.



TOWN OF RIDGELAND
WATER AND SEWER RESILIENCY IMPROVEMENTS PROJECT

APPENDIX B

**SCDOT ENCROACHMENT PERMIT FOR PART II SEWER REHABILITATION –
PERMIT NO. 267757**

**SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
Encroachment Permit**

Permit No : 267757

Permit Decision Date :
6/5/2023

Expiration Date : 6/5/2024

Type Permit :SEWER

Location:

<u>District</u>	<u>Work County</u>	<u>Type</u>	<u>Route</u>	<u>Aux</u>	<u>Begin MP</u>	<u>End MP</u>
6	Jasper, SC	US	17	None	29.019	28.591
6	Jasper, SC	US	278	None	19.177	19.024
6	Jasper, SC	S-	74	None	0.133	0.133
6	Jasper, SC	S-	66	None	0.135	0.009
6	Jasper, SC	S-	65	None	0.149	0.170
6	Jasper, SC	S-	65	None	0.001	0.163
6	Jasper, SC	S-	32	None	1.002	0.818
6	Jasper, SC	S-	59	None	0.352	0.412
6	Jasper, SC	SC	336	None	8.232	8.617
6	Jasper, SC	SC	336	None	8.617	8.467

Contact
Information

Applicant: TownofRidgeland

Phone:

Contact: Dennis E. Averkin

Address: PO Box 1119,

City: Ridgeland

State: SC

Zip: 29936

Comments

Within Town of Ridgeland: Jacob Smart Blvd, around Town Hall (3rd Ave, 2nd Ave, Floyd St, Town Square, Russell St, Weathersbee St), Green St, Wilson St, Main St and Grahamville Rd.De

Special
Provisions:

0002 - ALL REPAVING IS TO CONFORM TO STANDARD DEPARTMENT SPECIFICATIONS. THE ROAD, AT DROP INLETS, SHALL BE MILLED TO MAKE A SMOOTH TRANSITION WHEN PAVED. PAVEMENT WITH CURB AND/OR SIDEWALK WILL BE PAVED FULL DEPTH FROM OUTER EDGE TO GUTTER EDGE.

0003 - WHEN ROADS ARE RESURFACED, SHOULDERS SHALL BE REGRADED TO THE EDGE OF PAVEMENT TO CONFORM TO THE DEPARTMENT SPECIFICATIONS.

0004 - SCDOT SHALL BE NOTIFIED WHEN WORK DEFINED IN THE PERMIT

STARTS AS WELL AS WHEN THE WORK IS COMPLETED. REFERENCE SHALL BE MADE BY PERMIT NUMBER.

0005 - APPLICANT SHALL PROVIDE TO THE DEPARTMENT THE OPPORTUNITY OF ATTENDING ANY PRE-CONSTRUCTION MEETING PRIOR TO THE BEGINNING OF WORK.

0106 - MANHOLES SHALL CONFORM TO THE ELEVATION OF THE EXISTING ROADWAY OR SHOULDER AND CONSTRUCTED IN ACCORDANCE WITH ACCEPTED PRACTICES.

0107 - TRENCH TO BE PROPERLY BACK-FILLED AND THOROUGHLY TAMPED. THE ENTIRE DISTURBED AREA SHALL BE RE-SHAPED AND DRESSED OUT IN A WORKMANSHIP LIKE MANNER.

0111 - OPEN CUTS AND/OR BELL HOLES WITHIN THE ROAD PAVEMENT SHALL BE CUT IN NEAT LINES AND REPAIRED.

0115 - WHERE PAVEMENT IS CUT THE WORK SHALL BE DONE IN CLEAR WEATHER WHEN TRAFFIC IS LIGHTEST. THERE SHALL BE NO TRENCH LEFT OPEN IN THE TRAVELED WAY WHEN WORK IS NOT IN PROGRESS.

0116 - PAVEMENT SHALL BE CUT TO NEAT LIES AND THE TRENCH BACK-FILLED USING FLOWABLE MATERIAL AND TAMPED IN 6" LAYERS TO 95% DENSITY.

0117 - OPEN TRENCHES SHALL BE COVERED WITH METAL PLATES WHEN THE PAVEMENT CANNOT BE RESTORED THE SAME DAY. PLATES SHALL BE MONITORED PERIODICALLY TO ENSURE THAT THE TRENCH IS PROPERLY COVERED.

0123 - ALL WORK PERFORMED IN CONNECTION WITH THIS PERMIT SHALL CONFORM TO THE SCDOT "A POLICY FOR ACCOMODATING UTILITIES ON HIGHWAY RIGHT-OF-WAY" MOST CURRENT EDITION.

0125 - ALL CROSSLINE PIPES ARE TO BE LOCATED AND FLAGGED PRIOR TO BEGINNING OPERATION.

0209 - DISTURBED VEGETATION SHALL BE RESEDED ACCORDING TO THE SPECIFICAION FOR HIGHWAY CONSTRUCTION.

0210 - ALL SIDEWALKS TO INCLUDE AT DRIVEWAY RADIUS SHALL MEET (ADAAG) AMERICANS WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES.

0302 - NO EXCAVATION SHALL BE LEFT OPEN ALONG HIGHWAY.

0304 - PAVEMENT MARKINGS ALTERED DURING THIS INSTALLATION SHALL BE RESTORED BY THE APPLICANT.

0305 - FLASHING ARROW BOARDS SHALL BE USED FOR ALL LANE CLOSURES ON PRIMARY ROUTES AND/OR ROADS WITH HIGH TRAFFIC VOLUMES.

0306 - TRAFFIC CONTROL, LIGHTS, SIGNS AND FLAG-MEN WILL BE FURNISHED BY APPLICANT AND WILL CONFORM TO PART VI OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

0310 - FIELD CHANGES, IF NECESSARY, MUST BE APPROVED IN WRITING BEFORE ACTUAL CONSTRUCTION OF PROPOSED CHANGES.

0318 - THE APPLICANT SHALL BE RESPONSIBLE FOR IMMEDIATE REMOVAL OF SUCH TRAFFIC HAZARDS AS MUD, DEBRIS, LOOSE STONE, AND TRASH AS MAY BE WASHED OR SPILLED ON THE TRAVELED ROADWAY AS A RESULT OF THE PROPOSED WORK.

9999 - See Attached for Additional Special Provisions

Application for Encroachment Permit

S.C. Department of Transportation
Form 637 (Rev 09/2015)

Contact Information

Applicant:

Street:

City:

State: **Zip Code:**

Phone: **Fax:**

Email:

Contact:

Project Location

Primary County:

County	Road Name
<input type="text" value="Jasper"/>	<input type="text" value="Jacob Smart Blvd (US 17)"/>
<input type="text" value="Jasper"/>	<input type="text" value="3Rd Ave (S-64)"/>
<input type="text" value="Jasper"/>	<input type="text" value="2Nd Ave (S-74)"/>
<input type="text" value="Jasper"/>	<input type="text" value="Floyd St (S-66)"/>
<input type="text" value="Jasper"/>	<input type="text" value="Town Sq (US 278)"/>

1. Type of Encroachment:

Rehabilitation improvements to existing gravity sewer system including: replacing manhole frame/cover, lining manholes, cured in place pipe lining, remove and replacement of orangeburg gravity sewer pipe, and removal of water main from within gravity sewer manhole.(CONTINUED ON ADDENDUM)

2. Description of Location:

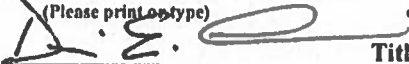
Within Town of Ridgeland: Jacob Smart Blvd, around Town Hall (3rd Ave, 2nd Ave, Floyd St, Town Square, Russell St, Weathersbee St), Green St, Wilson St, Main St and Grahamville Rd.

(Attach sketch indicating roadway features such as: pavement width, shoulder width, sidewalk and curb and gutter location, significant drainage structure, north arrow, right of way width, and location of the proposed encroachment with respect to the roadway centerline and the nearest intersecting road on the State system.)

Customer Agreement

3. The undersigned applicant hereby requests the SCDOT to permit encroachment on the SCDOT right of way as described herein. It is expressly understood that the encroachment, if and when constructed, shall be installed in accordance with the sketch attached hereto and made a part hereof. The applicant agrees to comply with and be bound by the SCDOT's "A Policy for Accommodating Utilities on Highways Rights of way", "Standard Specifications for Highway Construction", the "General Provisions" and "Special Provisions", attached hereto or made a part hereof by reference, during the installation, operation and maintenance of said encroachment within the SCDOT's Right of Way. **DISCHARGES OF STORM WATER AND NON-STORM WATER:** Work within State Highway right-of-way shall be conducted in compliance with all applicable requirements of the National Pollutant Discharge Elimination System (NPDES) permit(s) issued to the Department of Transportation (Department), to govern the discharge of storm water and non-storm water from its properties. Work shall also be in compliance with all other applicable Federal, State and Local laws and regulations, and with the Department's Encroachment Permits Manual and encroachment permit. The encroachment permit will not be issued until the applicant has received an NPDES construction permit from SC Department of Health and Environmental Control.

The applicant agrees to comply with all current SCDOT Standards Specifications for Highway Construction including all Supplemental Technical Specifications. The applicant hereby further agrees, and binds his/her/its heirs, personal representatives, successors, assigns, to assume any and all liability for accidents or injuries to persons, or damage to property, including the highway, that may be caused by the construction, maintenance, use, moving or removing of the physical appurtenances contemplated herein.

Applicant's Name: Date:
 Applicant's Sig:  (Please print or type) Title:

For Office Use Only

For Office Use Only

In accordance with your request and subject to all the provisions, terms, conditions, and restrictions stated in the application and the general and special provisions attached hereto, the SCDOT hereby approves your application for an encroachment permit. This permit shall become null and void unless the work contemplated herein shall have been completed prior to:

See Attached Special Provision and/or Permit Requirements

6/2/2023 (Date received by res. Maint. Engr)  NPDES Permit (SCDOT Approver) 6/2/2023 (Date)

Application for Encroachment Permit

General Provisions

1. **DEFINITIONS:** The word "Permittee" used herein shall mean the name of the person, firm, or corporation to whom this permit is addressed, his, her, its, heirs, personal representatives, successors and assigns. The word "DEPARTMENT" shall mean the South Carolina Department of Transportation.
2. **NOTICE PRIOR TO STARTING WORK:** Before starting the work contemplated herein within the limits of the highway right of way, the Department's Resident Maintenance Engineer in the county in which the proposed work is located shall be notified 24 hours in advance so that he may be present while the work is under way.
3. **PERMIT SUBJECT TO INSPECTION:** This permit shall be kept at the site of the work at all times while said work is under way and must be shown to any representative of the Department or law enforcement officer on demand.
4. **PROTECTION OF HIGHWAY TRAFFIC:** The applicant shall be responsible for the protection of the highway traffic at all times during the construction, maintenance, removing or moving of the encroachment permitted herein. Detours, barricades, warning signs and flagmen, as necessary, shall be provided by and at the expense of the Permittee and shall be in accordance with the "Manual on Uniform Traffic Control Devices" (MUTCD). The work shall be planned and carried out so that there will be the least possible inconvenience to the motoring public. The Permittee agrees to observe all rules and regulations of the Department while carrying on the work contemplated herein and take all other precautions that circumstances warrant.
5. **STANDARDS OF CONSTRUCTION:** All work shall conform to the Department's standards of construction and shall be performed in a workman-like manner. The applicant shall make adequate provisions for maintaining the proper drainage of the highway as it may be affected by the encroachment permitted herein. All work shall be subject to the supervision and satisfaction of the Department.
6. **FUTURE MOVING OF PHYSICAL APPURTENANCES:** If, in the opinion of the State Highway Engineer, it should ever become necessary to move or remove the physical appurtenances, or any part thereof contemplated herein, on account of change in location of the highway, widening of the highway, or for any other sufficient reason, such moving shall be done on demand of the Department at the expense of the Permittee, unless the Permittee has prior rights.
7. **RESTORATION OF HIGHWAY FACILITIES UPON MOVING OR REMOVING OF PHYSICAL APPURTENANCES:** If, and when, the physical appurtenances contemplated herein shall be moved or removed, either on the demand of the Department or at the option of the Permittee, the highway and facilities shall immediately be restored to their original condition at the expense of the Permittee, unless the Permittee has prior rights, if any.
8. **COSTS:** All work in connection with the construction, maintenance, moving or removing of the physical appurtenances contemplated herein shall be done by and at the expense of the Permittee.
9. **ADDITIONAL PERMISSIONS:**
 - (a) It is distinctly understood that this permit does not in any way grant or release any rights lawfully possessed by the abutting property owners. The Permittee shall secure any such rights, as necessary, from said abutting property owners.
 - (b) The Permittee shall be responsible for obtaining all other approvals or permits necessary for installation of the encroachment from other government entities.

- (c) There shall be no excavation of soil nearer than two feet to any public utility line or appurtenant facility except with the consent of the owner thereof, or except upon special permission of this Department after an opportunity to be heard is given the owner of such line or appurtenant facility.
10. **ADDITIONAL WORK PERFORMANCE:**
- (a) All crossings over the highway shall be constructed in accordance with "Specifications for Overhead Crossings of Light and Power Transmission Lines and Telegraph Lines over each other and over Highway Rights of Way in South Carolina," as approved by the Public Service Commission of South Carolina and effective as of date of this permit.
- (b) All tunneling, boring, or jacking shall be done in such a way as not to disturb the highway surfacing.
- (c) No pavement shall be cut unless specifically authorized herein.
- (d) No excavation shall be nearer than three feet to the edge of pavement unless specifically authorized herein.
- (e) Underground facilities will be located at minimum depths as defined in the "Utility Accommodations Manual" for the transmittant, generally as follows: 4 feet minimum for hazardous or dangerous transmittant, 3 feet minimum for other lines. The Department may approve shallower depths if adequate protection is provided. Such approval must be obtained in writing.
- (f) Service and other small diameter pipes shall be jacked, driven, or otherwise forced underneath the pavements on any surfaced road without disturbing the pavement. The section under the highway pavement and within a distance of three (3) feet on either side shall be continuous without joints.
11. **ACCESS:**
- (a) Permittee is responsible for maintaining reasonable access to private driveways during construction.
- (b) It is expressly provided that, with respect to any limited access highway, the Permittee shall not have or gain access from the main traveled way of the highway, or the on or off ramps to such facility, except upon approval by the Department.
12. **DRIVEWAYS:**
- (a) The existing crown of the highway shall be continued to the outside shoulder line of the highway.
- (b) If the driveway or approach is concrete pavement, the pavement shall be constructed at least 6 inches thick and with a minimum of class 2500 concrete. There shall be a bituminous expansion joint, not less than 3/4 inches in thickness, placed between the highway paving and the paving of the approach for the full width of the approach.
13. **BEAUTIFICATION:**
- (a) All trees, plants, flowers, etc. shall be placed in accordance with the provisions specifically stipulated herein.
- (b) All trees, plants, flowers, etc. shall be maintained by, and at the expense of, the Permittee and the provisions of this permit shall become null and void, if and when said Permittee ceases to maintain aid trees, plants, flowers, etc.
14. **AS-BUILT PLANS:**
- (a) The applicant shall provide the Department with survey-quality as-built plans in accordance with the requirements set forth in the Department's "A Policy for Accommodating Utilities on Highway Rights of Way".
15. **COMPLETE STREETS:**
- Reference Departmental Directive 28, "Complete Streets". For encroachment permit types that require a Traffic Impact Study (TIS), the applicant shall consider the inclusion of walking, bicycling, and transit accommodations within the scope of the encroachment. The applicant shall review walking, bicycling, and transit plans from Metropolitan Planning Organizations (MPOs), Councils of Government (COGs), and regional transit providers to determine the scope of accommodations for complete streets. Coordination with the District Permit Engineer is required to determine if the inclusion of walking, bicycling, and transit accommodations are conducive for implementation based on the scope of the encroachment.

Project Location/Type of Encroachment/Description of Location, addendum

1. Project Location:

County	Road Name
Jasper	Russell St (SC 336)
Jasper	Weathersbee St (S-65)
Jasper	Green St (S-32)
Jasper	W Wilson St (S-59)
Jasper	E Main St (SC 336)
Jasper	Grahamville Rd (SC 336)

2. Type of Encroachment:

3. Description of Location:

9999: Special Provisions

- A pre-construction meeting shall be held before any work can be performed on the Right of Way.
- Flowable fill shall be used as back fill in all open cuts in the roadway.
- Traffic control and detour plan shall be approved prior to any work being performed on the right of way.
- Pavement markings altered during this installation shall be restored by the applicant.