

CONTRACT DOCUMENTS AND SPECIFICATIONS

FOR

TOWN OF BLACKSBURG

I-85 SEWER UPGRADE PROJECT

RURAL INFRASTRUCTURE AUTHORITY

RIA GRANT R-18-3024

SUMMIT PROJECT NO. 17067

MAY 2018

**TOWN OF BLACKSBURG
105 S. SHELBY STREET
BLACKSBURG, SC 29702**

BID DOCUMENTS

CONTRACTOR: _____

ADDRESS: _____

CONTRACTOR'S LICENSE NUMBER: _____



SUMMIT ENGINEERING GROUP, INC.
Engineering • Experience • Excellence
9601 Warren H. Abernathy Highway
Spartanburg, SC 29301-5226
(864) 949-1111 Fax (864) 949-1110

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TOWN OF BLACKSBURG

I-85 SEWER UPGRADE PROJECT

RURAL INFRASTRUCTURE AUTHORITY

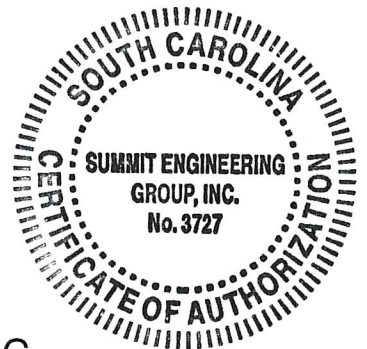
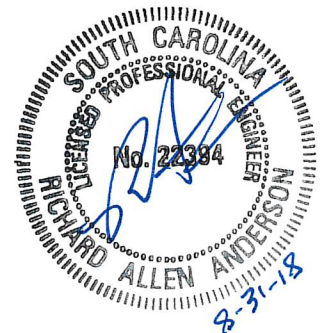
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SUMMIT ENGINEERING GROUP, INC.
9601 WARREN H. ABERNATHY HWY.
SPARTANBURG, SC 29301
TELEPHONE: (864) 949-1111



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MAY 2018

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ADVERTISEMENT FOR BIDS

The Town of Blacksburg will receive bids for the construction of the "I-85 SEWER UPGRADE PROJECT" until 2:00 PM on Tuesday, October 2, 2018 in the Council Chambers, at which time and place all bids will be opened and read aloud in public.

This project is to be bid as one (1) division of work. The Contract will be awarded to the responsible bidder producing the lowest total base bid. The following generally describes the work included:

Installation of new duplex pump station and controls, installation of approximately 1,900-linear feet of 4-inch sewer force main piping, 2 manholes, service connections, all appurtenances, and other associated work tasks for a complete and proper installation.

Contract and Bid documents and supportive information are on file at the following locations:

OWNER: Town of Blacksburg
105 S. Shelby Street
Blacksburg, SC 29702

ENGINEER: Summit Engineering Group, Inc.
9601 Warren H. Abernathy Highway
Spartanburg, SC 29301

CONTRACTOR SERVICES: Associated General Contractors (AGC) – Online Services

Copies of the contract drawings, specifications, and bid documents shall be obtained at the office of the Engineer upon receipt of a non-refundable payment of \$130.00 for each set. When requesting copies of the contract drawings, specifications and bid documents, provide the following information about your company: Mailing address, street / delivery address, telephone and facsimile numbers, and email address. All Bidders are required to purchase contract documents from the engineer.

Only those contract drawings, specifications and bid documents obtained from the Engineer are official. Bidders cannot rely on the accuracy of copies of the aforementioned documents, drawings, specifications, etc. obtained from any other sources. Bidders must be on the Engineer's official plan holders list for bids to be accepted by the Owner.

Bidders must deposit security with all bids. Security shall be in the form of a certified check or bid bond made payable to the Owner, and shall be for an amount equal to not less than five percent (5%) of the amount of the bid. Provisions of the security shall be as described in the Information for Bidders.

Performance and Payment Bonds, each in the amount of 100% of the contract price will be required of the successful bidder.

Funding for the project shall be provided via a grant from the S.C. Rural Infrastructure Authority Grant, and local match funding provided by the Town of Blacksburg. All SC Consolidated Procurement Code and Regulations will apply to the contract.

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

Any prospective bidder, contractor or subcontractor who is aggrieved in connection with the solicitation of this contract may protest to the Engineer (or) the 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.

No bid will be considered unless the bidder is legally qualified, on the date of the bid, under the provisions of the South Carolina Contractor's Licensing Law (South Carolina Code of Laws as amended on April 1, 1999, Chapter 11, Sections 40-11-10 through 40-11-428). Contractors shall have a classification of WL.

The Owner reserves the right to reject any or all bids or waive any informality in the bidding. The Owner anticipates award of the contract within thirty (30) days from the date of the opening of bids; however, to allow adequate time for funding agency approval, bids may be held by the Owner for a period not to exceed ninety (90) days from the date of the opening of bids.

“EQUAL EMPLOYMENT OPPORTUNITY”

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01. PROJECT DESCRIPTION

A. The project will generally require the following work activities:

- Installation of a new duplex sewer pump station and controls.
- Installation of approximately 30 feet of gravity sewer line.
- Installation of 1 manhole.
- Connection to existing sewer lines.
- Installation of approximately 4,600 feet of sewer force main.
- The installation, maintenance, and removal of erosion control facilities.
- Site restoration activities.
- Other associated appurtenances for a complete and proper installation.

B. General Information:

1. All work will be confined to the existing road rights of way and waterline easements and the Contractor shall take great care to ensure that all areas affected by construction activities are returned to original or better conditions.
2. Safety of area residents, construction personnel, and others associated with the project shall be given high priority at all times.
3. Strict adherence to daily clean-up requirements shall be expected of Contractor personnel, subcontractors, etc. Construction activities may be halted by the Engineer or the Owner should Contractor personnel, subcontractors, etc. fail to adhere to this requirement. No additional payment for such stoppage will be granted by the Owner.

4. Existing utilities damaged during construction shall be immediately repaired and placed back into service.
5. The Contractor is cautioned that all backfill shall meet "minimum" compaction requirement as stated in the specifications. Select backfill material, if required, shall be included in the unit price of the item to which it pertains. No additional payment shall be granted for select backfill material, regardless of the quantity required.

02. RECEIPT AND OPENING OF BIDS

- A. The Town of Blacksburg, hereinafter called the "Owner", invites bids on the " I-85 SEWER UPGRADE PROJECT ". The unit price bid form is attached hereto, all blanks of which must be appropriately filled in. Bids will be received by the Owner at the Town Hall located at 105 S. Shelby Street, Blacksburg, SC 29702, until 2:00 PM, October 2, 2018, at which time said bids will be publicly opened and read aloud. The envelopes containing the Bid, Bid Bond, and required attachments only, must be sealed, addressed to Town of Blacksburg, and designated as Bid for " I-85 SEWER UPGRADE PROJECT".
- B. The Owner may consider informal any bid not prepared and submitted in accordance with the provisions hereof and may waive any informalities or reject any and all bids. Any bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the time and date specified shall not be considered. No bidder may withdraw a bid within 90 days after the actual date of the opening thereof.
- C. Bids received prior to the advertised hour of opening will be securely kept, sealed. The officer whose duty it is to open them will decide when the specified time has arrived, and no Bid received thereafter will be considered: except that when a Bid arrives by mail after the time fixed for opening, but before the reading of all other Bids is completed, and it is shown to the satisfaction of the Owner that the non-arrival on time was due solely to delay in the mail for which the Bidder was not responsible, such Bid will be received and considered.
- D. Bidders are cautioned that, while telegraphic modifications of Bids may be received as provided above, such modifications, if not explicit and if in any sense subject to misinterpretation, shall make the Bid so modified or amended, subject to rejection.
- E. At the time and place fixed for the opening of Bids, the Owner will cause to be opened and read aloud every Bid received within the time set for receiving Bids, irrespective of any irregularities therein. Bids will be tabulated and a copy of such will be forwarded to each bidder.

03. QUALIFICATION OF BIDDER

- A. All bidders must be properly licensed and bonded to perform such proposed work in the State of South Carolina at the time of the bid. The Owner may make such investigations as is deemed necessary to determine the ability of the bidder to perform the work, and the bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. The Owner reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the Owner that such bidder is

properly qualified to carry out the obligations of the contract and to complete the work contemplated therein. Conditional bids will not be acceptable.

- B. Each Bidder shall, upon request of the Owner, submit on the form furnished for that purpose a statement of the Bidder's qualifications, his experience record in constructing the type of improvements embraced in the contract, his organization and equipment available for the work contemplated, and when specifically requested by the Owner, a detailed financial statement. The Owner shall have the right to take such steps as it deems necessary to determine the ability of the Bidder to perform his obligations under the Contract and the Bidder shall furnish the Owner all such information and data for this purpose as it may request. The right is reserved to reject any Bid where an investigation of the available evidence or information does not satisfy the Owner that the Bidder is qualified to carry out properly the terms of the Contract.
- C. Comply with the requirements as set forth in Section 01200 of the Contract Documents.

04. PREPARATION OF BID

- A. Each bid must be submitted on the Bid Form – (unit price reference Section 00311). All blank spaces for bid prices must be filled in, in ink or typewritten and a Bid Bond must be submitted with the bid.
- B. Bids which are incomplete, unbalanced, conditional or obscure, or which contain additions not called for, erasures, alterations, or irregularities of any kind, or which do not comply with the Information for Bidders, may be rejected at the option of the Owner.
- C. The correct total amount bid for the completed work is defined as the correct sum total of the amounts bid for the individual items in the Proposal. The correct amount bid for each unit price item is defined as the correct product of the quantity listed for the item by the unit price bid.
- D. Each bid must be submitted in a sealed envelope bearing on the outside the name of the bidder, bidder's address, Contractor's License Number, and the name of the project for which the bid is submitted. If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed as specified above.
- E. The following items shall also be attached with the bid:
 - 1. Bid Bond – Refer to Section 00350
 - 2. Non-Collusive Affidavit of Prime Bidder – Refer to Section 00604

05. UNIT PRICE BID

- A. The unit price for each of the several items in the proposal of each Bidder shall include its prorata share of overhead and profit so that the sum of the products obtained by multiplying the quantity shown for each item by the unit price Bid represents the total. Any Bid not conforming to this requirement may be rejected as informal. The special attention of all Bidders is called to this provision, for should conditions make it necessary to revise the quantities, no limit will be fixed for such increased or decreased quantities, nor extra compensation allowed, provided the net monetary value of all such additive and subtractive changes in quantities of such items of work (i.e., difference in cost) shall not increase or decrease the total original contract price by more than twenty-five

percent (25%), except for work not covered in the Drawings and Technical Specifications as provided for in the General Conditions.

06. COLLUSIVE AGREEMENTS

- A. Each Bidder submitting a Bid to the Owner for any portion of the work contemplated by the documents on which Bidding is based shall execute and attach thereto, a statement substantially in the form herein provided (Section 00604), to the effect that he has not entered into a collusive agreement with any other person, firm, or corporation with regard to any Bid submitted.

07. BID SECURITY

- A. Each bid must be accompanied by cash, certified check of the bidder, or a Bid Bond prepared on the form of bid bond attached hereto (Section 00350), duly executed by the bidder as principal and having as surety thereon a surety company approved by the Owner, in the amount of five percent (5%) of the bid. Bid bonds and/or certified checks will be returned to all except the three lowest bidders within three days after the opening of bids, and the remaining bid bonds and/or certified checks will be returned promptly after the Owner and the accepted bidder have executed the contract, or, if no award has been made within 90 days after the date of the opening of the bids, upon demand of the bidder at any time thereafter so long as bidder has not been notified of the acceptance of its bid.

08. ADDENDA AND INTERPRETATIONS

- A. No interpretation of the meaning of the plans, specifications or other pre-bid documents will be made to any bidder orally. Each request for such interpretation should be in writing, addressed to Summit Engineering Group, Inc., 9601 Warren H. Abernathy Highway, Spartanburg, South Carolina 29301. To be given consideration, the request must be received at least five days prior to the date fixed for the opening of bids. Any and all such interpretations and any supplemental instructions will be in the form of written addenda to the specifications which, if issued, will be mailed to all prospective bidders (at the respective addresses furnished for such purposes), no later than three days prior to the date fixed for the opening of bids. Failure of any bidder to receive any such addendum or interpretation shall not relieve such bidder from any obligation under its bid as submitted. All addenda so issued shall become part of the contract documents.

09. TELEGRAPHIC MODIFICATION AND CORRECTIONS

- A. Any bidder may modify his bid by telegraphic or facsimile communication at any time prior to the scheduled time for receipt of bids, provided such telegraphic or facsimile communication is received by the Owner prior to closing time, and provided further the Owner is satisfied that a written confirmation of the telegraphic or facsimile modification over the signature of the bidder was mailed prior to the closing time. The telegraphic or facsimile communication should not reveal the bid price, but should provide the addition or subtraction or other modification so that the final prices or terms will not be known by the Owner until the sealed bid is opened. If written confirmation is not received within two days from the closing time, no consideration will be given to the telegraphic or facsimile modification.

- B. Erasures or other changes in the Bids must be explained or noted over the signature of the Bidder.

10. OBLIGATION OF BIDDER

- A. At the time of the opening of bids, each bidder will be presumed to have inspected the site and to have read and be thoroughly familiar with the plans and contract documents, including all addenda. The failure or omission of any bidder to examine any form, instrument or document shall in no way relieve any bidder from any obligation in respect to its bid.

11. NOTICE OF SPECIAL CONDITIONS

- A. Attention is particularly called to those parts of the contract documents and specifications that deal with the following:
 - (1) Inspection and testing of materials
 - (2) Insurance requirements
 - (3) Permits and Rights-of-way

12. WITHDRAWAL OF BIDS:

- A. Bids may be withdrawn or written or telegraphic request dispatched by the Bidder in time for delivery in the normal course of business to the time fixed for opening; provided that written confirmation of any telegraphic withdrawal over the signature of the Bidder is placed in the mail and postmarked prior to the time set for Bid opening. The Bid guaranty of any Bidder withdrawing his Bid in accordance with the foregoing conditions will be returned promptly.

13. AWARD OF CONTRACT - REJECTION OF BIDS:

- A. If at the time this contract is to be awarded, the lowest base bid submitted by a responsible bidder does not exceed the amount of funds then estimated by the Owner as available to finance the contract; the contract will be awarded on the base bid only. If such bid exceeds such amount, the Owner may reject all bids or may award the contract on the base bid combined with such deductible alternatives applied in numerical order in which they are listed in the Form of Bid, as produces a net amount which is within the available funds. The Owner will decide which is the lowest qualified bidder, and in determining such bidder, the following elements will be considered for each bidder:
 - (1) Maintains a permanent place of business.
 - (2) Has adequate plant equipment and personnel to perform the work properly and expeditiously.
 - (3) Has suitable financial status to meet obligations incident to the work.
 - (4) Has appropriate technical experience.
 - (5) Has successfully provided evidence to the Owner of projects completed by the Bidder which are similar to the project proposed.
- B. The Owner reserves the right to consider as unqualified to do the work any Bidder who does not habitually perform, or does not plan to perform, with his own forces the major portions of the work involved in construction of the improvements embraced in this Contract. The maximum amount of subcontract work shall not exceed 30 percent of the total project cost without prior approval of the Owner. The Owner reserves the right to

either accept or reject any bid where the planned subcontract amount exceeds 30% of the total bid amount.

14. LIQUIDATED DAMAGES FOR FAILURE TO ENTER INTO CONTRACT

- A. The successful bidder, upon failure or refusal to execute and deliver the contract and bonds required within ten (10) days after they have received notice of the acceptance of their bid, shall forfeit to the Owner, as liquidated damages for such failure or refusal, the security deposited with the bid.

15. SECURITY FOR FAITHFUL PERFORMANCE

- A. Simultaneously with bidder's delivery of the executed contract, the Contractor shall furnish a surety bond or bonds as security for faithful performance of this contract and for the payment of all persons performing labor on the project under this contract, as specified in General Conditions included herein. The surety on such bond or bonds shall be a duly authorized surety company, bond shall be countersigned by an agent residing in South Carolina, and the said surety shall be satisfactory to the Owner.

16. POWER OF ATTORNEY

- A. Attorneys-in-fact who signs bonds or contract bonds must file with each bond a certified and effectively dated copy of their power of attorney. The residing agent shall be listed on the Power of Attorney.

17. LAWS AND REGULATIONS

- A. The Bidder's attention is directed to the fact that all applicable State laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout, and they will be deemed to be included in the contract the same as though herein written out in full.

18. SUBCONTRACTS

- A. Bidders are specifically advised that any person, firm or other party to whom it is proposed to award a subcontract under this contract must be acceptable to the Owner. The Owner's acceptance shall also be contingent upon acceptance of the subcontract by the S.C. Department of Commerce and the Appalachian Council of Governments.
- B. Bidders must perform the work with his own labor and materials with no more than 30% of the work (based on cost) to be performed by subcontractors without written approval of the Owner prior to the award of the contract.

19. TIME OF COMPLETION AND LIQUIDATED DAMAGES

- A. Bidder must agree to commence work on or before a date to be specified in a written "Notice to Proceed" from the Owner and to fully complete the project within one hundred fifty (150) days.
- B. Bidders should be aware that the "Time of Completion" specified not only includes completion of all construction activities, but completion of all testing, clean-up operations, grassing activities, and submittal of all final closeout documents. The issuance of a Permit to Operate from SCDHEC is also included in the specified

completion time.

- C. If the project remains uncompleted past the completion date, the Bidder may become liable for liquidated damages in the amount of \$500.00 per calendar day for each day the project remains uncompleted.

20. CONDITIONS OF WORK

- A. Each bidder must inform himself fully of the conditions relating to the construction of the project and the employment of labor thereon. Failure to do so will not relieve a successful bidder of the obligation to furnish all material and labor necessary to carry out the provisions of the contract. Insofar as possible, the Contractor in carrying out the work must employ such methods or means as will not cause any interruption of or interference with the work of any other contractor.

21. RIGHTS-OF-WAY AND EASEMENTS

- A. Highway rights-of-way of the SCDOT will be involved in this project. Restoration of highway rights-of-way must be to the full satisfaction of the SCDOT.
- B. Highway rights-of-way of Cherokee County will be involved in this project. Restoration of the roads rights-of-way must be to the full satisfaction of the Cherokee County.

22. EXISTING UTILITIES

- A. Existing utilities in the project area include water distribution lines, underground telephone cables, underground fiber optic cables, underground electric lines, underground gas lines, and storm drainage facilities. Other utilities may be present in the area and it will be the Contractor's responsibility to ascertain such.

23. LOCATE SERVICES AND FIELD VERIFICATION OF EXISTING UTILITIES

- A. The Bidder/ Contractor must provide notice of intent to excavate in accordance with the South Carolina Underground Utility Damage Prevention Act. Upon completion of existing utility locates, the Contractor shall field verify all locations, depths, sizes, and types of existing utilities along the project route. Field verification will require the Contractor to excavate and expose all existing utilities which might be affected or interfere with the proposed construction. Exact locations and depths of the existing utilities shall be reported to the Engineer for review.
- B. The Contractor shall immediately notify the Engineer of any existing utility location affecting installation of the proposed improvements.

24. DETERMINATION OF FINAL LOCATIONS

- A. Upon submittal of findings of field locate and verification services to the Engineer for all existing utilities, confirm final location of the proposed improvements with the Engineer. Do not begin installation of the proposed improvements until concurrence has been obtained from the Engineer.

25. CONNECTION TO EXISTING WATER LINES

- A. Coordinate connection to existing water lines with the Owner and the Engineer. Do not perform connection without the presence of a representative from the Owner and / or Engineer on site during the connection.

26. CLEAN-UP AND GRASSING

- A. The Contractor is cautioned to include in his bid adequate costs of daily clean-up activities and refurbishment of existing road shoulders, ditches, residential lawns, etc. as the Contractor will be required to strictly adhere to the clean-up and grassing requirements of the contract documents.
- B. The Contractor shall remove all construction debris from the work site on a daily basis. All ditch lines shall be re-graded and storm drainage pipes cleaned out, if necessary. All daily work areas shall be rough graded and prepared for final grading and grassing. By the end of each week, the work site shall be fine graded, raked, pulverized, fertilized, seeded, and straw applied. Unless otherwise approved, the Contractor shall not begin a new week's work until the previous week's work area has been cleaned-up and satisfactorily grassed and straw applied.
- C. All unpaved areas disturbed by the construction activities shall be re-grassed and straw applied.

27. SCDHEC PERMIT TO OPERATE

- A. Issuance of a Permit to Operate by SCDHEC will require submittal of the Engineer's final engineering certification, record copies of acceptable testing results, and "as-built" drawings. The Contractor shall submit "as-built" drawings with each partial payment request. "As-built" drawings will be reviewed by the Engineer for completeness prior to processing of partial payment requests.
- B. Should SCDHEC require a final inspection prior to the issuance of a permit to operate, the Contractor shall be present on-site during the final inspection.

28. EXECUTION OF AGREEMENT - PERFORMANCE AND PAYMENT BONDS

- A. Subsequent to the award and within ten (10) days after the prescribed forms are presented for signature, the successful Bidders shall execute and deliver to the Owner an Agreement in the form included in the Contract Documents in such number of copies as the Owner may require.
- B. Having satisfied all conditions of award as set forth elsewhere in these documents, the successful Bidders shall, within the period specified in paragraph "A" above, furnish a surety bond in a penal sum no less than the amount of the Contract as awarded, as security for the faithful performance of the Contract, and for the payment of all persons, firms, or corporations to whom the Contractor may become legally indebted for labor, materials, tools, equipment, or service of any nature including utility and transportation services, employed or used by him in performing the work. Such bond shall be in the same form as that included in the Contract Documents and shall bear the same date as, or a date subsequent to that of the Agreement. The current power of attorney for the person who signs for any surety company shall be attached to such bond. All bonds shall be countersigned by a resident agent of the State in which the work takes place.

29. CONTRACTOR LICENSES

- A. The Bidder shall have a valid Contractor's license at the time of the Bid to perform work in the State of South Carolina. The limits of such license must be equal to or greater than the work on which a Bid is submitted. The Contractor's license number is to be written on the outside of the Bid envelope. Failure to list the Contractor's license numbers may be cause for the Bid to be rejected.

30. LICENSE AND PERMITS

- A. The successful Bidder must secure all State and local permits required. Such permits must be readily available at all times for inspection.

31. INSPECTION

- A. The work is to be jointly inspected by the Engineer and Owner. All work is subject to inspection and approval of the Engineer, Owner, SCDOT, Cherokee County, and SCDHEC. The Contractor shall immediately repair and rework any and all work not approved by these parties.

END OF SECTION

SECTION 00311

BID FORM

for the

I-85 SEWER UPGRADE PROJECT

TOWN OF BLACKSBURG

Date: _____

Summit Project No. 17067

PROPOSAL OF _____, doing business as a corporation / a partnership / an individual (Strike out inapplicable terms), with its principal office in the City of _____, County of _____, State of _____, (hereinafter called "Bidder").

TO: Town of Blacksburg
(hereinafter called "Owner"),

Gentlemen:

The Bidder, in compliance with your invitation for bids for the construction of "I-85 SEWER UPGRADE PROJECT", having examined the plans and specifications with related documents and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project, including the availability of materials and labor, hereby proposes to furnish all labor, materials and supplies as required and to construct the project in accordance with the Contract Documents, within the time set forth therein, and at the prices stated below. These prices are to cover all expenses incurred in performing the work required under the Contract Documents, of which this proposal is a part.

The Bidder hereby agrees to commence work under this contract on or before a date to be specified in written "Notice to Proceed" from the Owner and to fully complete the project within one hundred fifty **(150)** consecutive calendar days thereafter as stipulated in the specifications. Bidder further agrees to pay as liquidated damages the sum of **\$500.00** for each consecutive calendar day thereafter as hereinafter provided in Paragraph 19 of the General Conditions.

The drawings, specifications and addenda are complementary of each other. What is called for by one shall be as binding as if called for by all. If a conflict arises between the drawings, specifications, and/or addenda and is discovered by the contractor, the problem shall be referred to the Engineer as soon as possible for resolution by the Engineer. Should a conflict occur which is not resolved before bid time and/or is necessary to comply with mandatory requirements (i.e., codes, ordinances, etc.), it shall be the contractor's responsibility to price and bid the more expensive method.

Bidder acknowledges receipt of the following addendum:

BID FORM
00311-1

Town of Blacksburg

Project No. 17067

No. _____ Dated _____ No. _____ Dated _____
 No. _____ Dated _____ No. _____ Dated _____

Bidder agrees to perform all of the sewer system improvements described in the specifications and shown on the plans for the following unit prices:

A. BASE BID:

<u>Item No.</u>	<u>Description</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
1.	Contractor Mobilization	L.S.	(5% Max. of Total Bid)	\$ _____
2.	New Duplex Pump Station	L.S.	\$ _____	\$ _____
3.	Pump Station Site Work	L.S.	\$ _____	\$ _____
4.	Gravity Sewer Line – PVC, Open Cut			
a.	8-inch PVC SDR 35	30 LF	\$ _____	\$ _____
5.	Manholes			
a.	New 4-ft. diameter	1 EA	\$ _____	\$ _____
6.	Connect to Existing Sewer			
a.	At EX MH Sta. 0+00 (Force Main Connection)	1 LS	\$ _____	\$ _____
7.	6-inch Sewer Force Main			
a.	PVC, C-900	4,430 LF	\$ _____	\$ _____
b.	Ductile Iron Pipe, Restrained Joint	240 LF	\$ _____	\$ _____
8.	Erosion Control Facilities:			
a.	Temporary Construction Entrances	1 EA	\$ _____	\$ _____
b.	Sediment Tube Check Dams	31 EA	\$ _____	\$ _____

c. Sediment Tube Inlet Protection	2 EA	\$ _____	\$ _____
d. Silt Fence	1,000 LF	\$ _____	\$ _____
e. Supplemental Gravel	100 TONS	\$ _____	\$ _____
f. Supplemental Rip-Rap	60 TONS	\$ _____	\$ _____
g. Grassing	1 LS	\$ _____	\$ _____

9. Pavement Replacement:

a. Full Depth Pavement Patch	100 LF	\$ _____	\$ _____
b. Asphalt Pavement	100 SY	\$ _____	\$ _____

10. Testing:	1 LS	\$ _____	\$ _____
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11. Classified Excavation	100 CY	\$ <u>100.00</u>	\$ <u>10,000.00</u>
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12. Contractor Demobilization	L.S.	(Min. of 1% Total Bid)	\$ _____
-------------------------------	------	------------------------	----------

TOTAL BASE BID _____

_____ **Dollars** _____ **Cents (\$ _____)**

Amounts are to be shown in both words and figures. In case of discrepancy, the amount shown in words will govern.

The above unit prices shall include all labor, materials as required, bailing, shoring, removal, overhead, profit, insurance, etc., to cover the finished work of the several kinds called for.

The Bidder declares that he understands that the quantities shown in the Proposal are subject to adjustment by either increase or decrease and that should the quantities of any of the items of the work be increased, the undersigned proposes to do the additional work at the unit prices stated herein, and should the quantities be decreased, he also understands that payment will be made on actual quantities at the unit price bid, and will make no claim for anticipated profits for any decrease in the quantities and that actual quantities will be determined upon completion of the work, at which time adjustment will be made to the contract amount by direct increase or decrease.

Bidder understands that the Owner reserves the right to reject any or all bids and to waive any informalities in the bidding.

The Bidder agrees that this bid shall be good and may not be withdrawn for a period of 90 calendar days after the scheduled closing time for receiving bids.

Upon receipt of written notice of the acceptance of this bid, Bidder will execute the formal contract attached within 10 days.

By submission of this bid, each bidder certifies, and in the case of a joint bid, each party thereto certifies as to its own organization, that this bid has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this bid, with any other bidder or with any competitor.

Attachments to Bid

The following properly completed items are to be attached to the Bid:

1. Section 00350, Bid Bond
2. Section 00604, Non-Collusion Affidavit of Prime Bidder

Respectfully submitted:

SEAL - (If bid is by a corporation)

By: _____
Company Name

Business Address: _____

Signature

Printed Name

Telephone No. _____

Fax No. _____

Title

Email Address: _____

END OF SECTION

SECTION 00350

BID BOND

KNOW ALL MEN BY THESE PRESENTS:

That we, the undersigned _____ as Principal,
and _____ as Surety, are hereby held and firmly bound unto
the Town of Blacksburg, in the penal sum of _____
_____ Dollars and _____ Cents
(\$ _____), for the payment of which, well and truly to be made, we hereby jointly
and severally bind ourselves, successors and assigns.

Signed this _____ day of _____, 20____.

The condition of the above obligation is such that: Whereas, the Principal has submitted to the Town of Blacksburg a certain Bid, attached hereto and by reference made a part hereof, to enter into a contract in writing for the "I-85 SEWER UPGRADE PROJECT".

NOW, THEREFORE,

- (a) If said BID shall be rejected, or
- (b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attachment hereto (properly completed in accordance with said BID) and shall furnish a BOND for faithful performance of said contract, and for the payment of all persons performing labor furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID, then this obligation shall be void; otherwise the same shall remain in force and effect - it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extension of the time within which the OWNER may accept such BID, and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

Principal

(Corporate Seal)

BY: _____(L.S.)

Surety

(Corporate Seal)

BY: _____(L.S.)

Resident Agent

By: _____

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

NOTE: Bond must be countersigned by a South Carolina resident agent.

END OF SECTION

BID BOND
00350-2

Project No. 17067

SECTION 00400
NOTICE OF INTENT TO AWARD

OWNER: Town of Blacksburg
105 S. Shelby Street
Blacksburg, SC 29702

PROJECT DESCRIPTION: I-85 SEWER UPGRADE PROJECT

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:

DATE BIDS WERE RECEIVED:

AMOUNT OF BASE BID:

ALTERNATE (S) ACCEPTED: #

TOTAL AMOUNT OF BASE BID W/ 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 the S.C. Rural Infrastructure Authority.

(Print or Type Name)

(Award Authority Title)

(Signature)

(Date Posted)

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

CONSTRUCTION CONTRACT

expires after the time specified in Paragraph 4.02 for Substantial Completion until the Work is substantially complete.

ARTICLE 5 – CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to the paragraph below:

- A. For all Work, at the prices stated in Contractor's Bid, attached hereto as an exhibit.
- B. Sum of Approved Contract Amount: \$_____.

ARTICLE 6 – PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments

- A. Contractor shall submit Applications for Payment in accordance with Paragraph 24.1 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02 Progress Payments; Retainage

- A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment as provided in Paragraphs 6.02.A.1 and 6.02.A.2 below. All such payments will be measured by the schedule of values established by the Engineer as provided in Paragraph 35 of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements:
 - 1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Engineer may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 25 of the General Conditions:
 - a. Retention of up to 10% of payment claimed until construction is fully complete; a final Permit to Operate has been issued by the approving authority and contractor compliance with Section 01700 of the Contract Documents;

6.03 Final Payment

- A. Upon receipt of the final Application for Payment accompanied by Engineer's recommendation of payment in accordance with Paragraph 26 of the General Conditions, Owner shall pay Contractor as provided in Paragraph 26 of the General Conditions the remainder of the Contract Price as recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages.

ARTICLE 7 – INTEREST

7.01 All moneys not paid when due as provided in Paragraph 25 of the General Conditions may bear interest at the maximum legal rate not to exceed an annual rate of twelve percent (12%).

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

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

- A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

- B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Contractor does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.
- E. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
- F. Contractor has correlated the information known to Contractor, 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. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
- H. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 Contents

- A. The Contract Documents consist of the following:
 - 1. This Agreement.
 - 2. Performance bond.
 - 3. Payment bond.
 - 4. General Conditions.
 - 5. Supplementary Conditions.
 - 6. Specifications as listed in the table of contents.
 - 7. Drawings as described in Section 00851, Drawing Index.
 - 8. Addenda (numbers ____ to ____, inclusive).
 - 9. Exhibits to this Agreement (enumerated as follows):
 - a. Contractor's Bid (pages ____ to ____, inclusive).
 - b. Documentation (Contractor / Subcontractor Qualifications) submitted by Contractor prior to Notice of Award.
 - c. _____.
 - 10. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
 - a. Notice to Proceed.
 - b. Work Change Directives.
 - c. Change Order(s).
- B. The documents listed in Paragraph 9.01.A are considered a part of this Agreement.

- C. There are no Contract Documents other than those listed above in this Article 9.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraphs 17 and 18 of the General Conditions.

ARTICLE 10 – MISCELLANEOUS

10.01 Terms

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

10.02 Assignment of Contract

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

10.03 Successors and Assigns

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

10.04 Severability

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

ARTICLE 11 – EXECUTION OF AGREEMENT

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement in four copies. One counterpart each has been delivered to Owner, Contractor, Engineer, and Agency. All portions of the Contract Documents have been signed, initialed, or identified by Owner and Contractor or identified by Engineer on their behalf.

This Agreement is dated _____. This Agreement shall not be effective unless and until Agency's designated representative concurs.

OWNER:

CONTRACTOR

By: _____

Title: _____

[CORPORATE SEAL]

Attest: _____

Title: _____

Address for giving notices:

By: _____

Title: _____

[CORPORATE SEAL]

Attest: _____

Title: _____

Address for giving notices:

Agent for service of process:

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

SECTION 00600
PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS THAT

(Name of Contractor)

(Address of Contractor)

a (Corporation, Partnership or Individual), hereinafter called Principal, and

(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

Town of Blacksburg

(Name of Owner)

105 S. Shelby Street, Blacksburg, SC 29702

(Address of Owner)

hereinafter called Owner, in the penal sum of _____
Dollars and _____ Cents (\$_____) in lawful money of the United
States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs,
executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas the Principal entered into a certain
Contract with the Owner dated the _____ day of _____, 20_____, a copy of which
is hereto attached and made a part hereof for the construction of:

I-85 SEWER UPGRADE PROJECT

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the
undertakings, covenants, terms, conditions and agreements of said Contract during the original term
thereof, and any extensions thereof which may be granted by the Owner, with or without notice to the
Surety, and if he shall satisfy all claims and demands incurred under such contract and fully indemnify
and save harmless the Owner from all costs and damages which it may suffer by reason failure to do
so, and shall reimburse and repay the Owner all outlay and expense which the Owner may incur in
making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED FURTHER, that the said Surety, for value received hereby stipulates and agrees that no
change, extensions of time, alteration or addition to the terms of the Contract or to the work to be
performed thereunder or the specifications accompanying the same shall in any way affect its obligation
on this bond, and it does hereby waive notice of any such change, extension of time, alteration or
addition to the terms of the Contract or to the work or to the specifications.

PROVIDED FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in four (4) counterparts, each one of which shall be deemed an original, this the _____ day of _____, 20____.

Signed, sealed and delivered in the presence of:

Principal – Contractor

By:

As to Principal

Title

Surety

By:

Attorney-In-Fact
(Power of Attorney to be Attached)

By:

Resident Agent Signature

As to Surety

Resident Agent (Typed or Printed Name)

Resident Agent Company Name

Resident Agent Company Address

NOTES:

1. Date of Bond must not be prior to date of Contract.
2. If Contractor is a Partnership, all partners should execute bond.
3. Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

END OF SECTION

PERFORMANCE BOND

00600-2

Project No. 17067

SECTION 00601

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS THAT

(Name of Contractor)

(Address of Contractor)

a (Corporation, Partnership or Individual) , hereinafter called Principal, and

(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

Town of Blacksburg

(Name of Owner)

105 S. Shelby Street, Blacksburg, SC 29702

(Address of Owner)

hereinafter called Owner, in the penal sum of _____ Dollars _____ Cents
(\$ _____) in lawful money of the United States, for the payment of which sum well and
truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and
severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas the Principal entered into a certain
Contract with the Owner dated the _____ day of _____, 20_____, a copy of which
is hereto attached and made a part hereof for the construction of:

I-85 SEWER UPGRADE PROJECT

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, subcontractors
and corporations furnishing materials for or performing labor in the prosecution of the work provided for
in such contract, and any authorized extension or modification thereof, including all amounts due for
materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools,
consumed or used in connection with the construction of such work, and all insurance premiums on
said work, and for all labor, performed in such work whether by subcontractor or otherwise, then this
obligation shall be void; otherwise to remain in full force and effect.

PROVIDED FURTHER, that the said Surety, for value received hereby stipulates and agrees that no
change, extensions of time, alteration or addition to the terms of the Contract or to the work to be
performed thereunder or the specifications accompanying the same shall in any way affect its obligation
on this bond, and it does hereby waive notice of any such change, extension of time, alteration or
addition to the terms of the Contract or to the work or to the specifications.

PROVIDED FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in four (4) counterparts, each one of which shall be deemed an original, this the _____ day of _____, 20_____.

Signed, sealed and delivered in the presence of:

_____	By:	_____
		Principal - Contractor
_____		_____
As to Principal		Title

		Surety
	By:	_____
		Attorney-In-Fact
		(Power of Attorney to be Attached)
_____	By:	_____
		Resident Agent Signature
As to Surety		Resident Agent (Typed or Printed Name)

		Resident Agent Company Name

		Resident Agent Company Address

		Resident Agent Address

NOTES:

1. Date of Bond must not be prior to date of Contract.
2. If Contractor is a Partnership, all partners should execute bond.
3. Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

END OF SECTION

PAYMENT BOND
00601-2

Project No. 17067

SECTION 00602
NOTICE OF AWARD

TO:

PROJECT DESCRIPTION: I-85 SEWER UPGRADE PROJECT

On behalf of the Town of Blacksburg, this is to advise that 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 bid has been accepted for items in the amount of:
\$_____.

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 within 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 this notice, said Owner will be entitled to consider all your rights arising out of the Owner's acceptance of your bid as 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 the _____th day of _____, 20_____.

Town of Blacksburg

(Signature)

By: _____
(Print Name)

Title: _____

Acceptance of Notice

Receipt of the above Notice of Award is hereby acknowledged by _____, this the
_____ day of _____, 20_____.

By: _____

Title: _____

SECTION 00603
CONTRACT CHANGE ORDER

CONTRACT CHANGE ORDER		ORDER NO.	
		DATE	
		STATE	
CONTRACT FOR:	I-85 SEWER UPGRADE PROJECT	COUNTY	
OWNER:	Town of Blacksburg		
To:			
	(Contractor)		
You are hereby requested to comply with the following changes from the contract plans and specifications:			
Description of Changes		DECREASE	INCREASE
(Supplemental Plans and Specifications Attached)		in Contract Price	in Contract Price
TOTALS		\$0.00	\$0.00
NET CHANGE IN CONTRACT PRICE		\$0.00	
JUSTIFICATION:			
The amount of the Contract will be (Decreased) (Increased) By the Sum Of:			
The Contract Total Including this and previous Change Orders Will Be:			
The Contract Period Provided for Completion Will Be (Increased) (Decreased) (Unchanged):			
This document will become a supplement to the contract and all provisions will apply hereto.			
Requested:			
	(Owner)		(Date)
Recommended:			
	(Owner's Architect/Engineer)		(Date)
Accepted:			
	(Contractor)		(Date)
Agency Approval:			
	(Name and Title)		(Date)

SECTION 00604

NON-COLLUSION AFFIDAVIT OF PRIME BIDDER

STATE OF _____)

COUNTY OF _____)

_____, being first duly sworn, deposes and says that:

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

(Signed) _____

(Title)

Subscribed and sworn to before me

this _____ day of _____, 20__

(Title)

My commission expires: _____

SECTION 00606

NOTICE TO PROCEED

TO: _____

DATE: _____

PROJECT DESCRIPTION: I-85 SEWER UPGRADE PROJECT
OWNER: Town of Blacksburg
SUMMIT PROJECT NO: 17067

On behalf of the Town of Blacksburg, you are hereby notified to commence WORK in accordance with the Agreement dated _____, on or before _____, and you are to complete the WORK within 150 consecutive calendar days thereafter.

The date of completion of all work is therefore: _____.

Town of Blacksburg

BY: _____

Acceptance of Notice

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by _____
on this, the _____ day of _____, 20_____.

BY: _____

TITLE: _____

SECTION 00690
CONTRACTOR'S AFFIDAVIT

The State of _____ Date: _____

The County of _____

The City/Town of _____

(Officer's Name) (Officer's Title) of _____
(Contractor's Name)

being duly sworn, deposes and says that _____
(Contractor's Name)

has furnished all labor and material entering into the I-85 SEWER UPGRADE PROJECT called for in the Contract Documents dated _____ with the _____ and further states that this officer has full knowledge of all obligations for such labor and materials which have entered into and become part of that certain project known and designated above, and that this officer further deposes and says that all debts and other obligations for such labor and materials have been fully and completely paid for in good and lawful money of the United States of America and that there are no suits for damages against them proceeding, prospective and/or that there are no suits for damages against them proceeding, prospective, or otherwise, in consequence of their operations on the above said project.

The said _____ will hold the Owners,
(Contractor's Name)

_____, blameless of any and all mechanic's liens that may be hereafter entered or filed for record, so as to constitute charge against said premises for work or labor done or materials furnished by them.

IN WITNESS HEREOF, this officer has heretofore put his hand and seal: (Seal)

Officer's Name: _____

I, _____, Notary Public in and for the above named County and State do hereby certify that _____ (Officer's Name) personally known to me to be the affiant in the foregoing Affidavit, personally appeared before me this day and, having been duly sworn, deposes and says that the facts set forth in the above Affidavit are true and correct.

WITNESS my hand and seal this _____ day of _____, 20 _____

Notary Public for the State of _____

(Seal)

My Commission Expires: _____

END OF SECTION

SECTION 00700

GENERAL CONDITIONS

1. CONTRACT AND CONTRACT DOCUMENTS. The plans, specifications and addenda, hereinafter enumerated in Paragraph 1 of Supplemental General Conditions, shall form part of this contract and the provisions thereof shall be as binding upon the parties hereto as if they were herein fully set forth. The table of contents titles, heading, running headlines and marginal notes contained herein and in said documents are solely to facilitate reference to various provisions of the contract documents and in no way affect, limit or cast light on the interpretations of the provisions to which they refer.

Contents

1. Contract and Contract Documents	24. Construction Schedule and Periodic Estimates
2. Definitions	25. Payments to Contractor
3. Additional Instructions and Detail Drawings	26. Acceptance of Work and Final Payment
4. Shop Drawings and Samples	27. Acceptance of Final Payment as Release
5. Materials, Services & Facilities	28. Payments by Contractor
6. Contractor's Title to Materials	29. Insurance
7. Inspection and Testing of Materials	30. Contract Security
8. "Or Equal" Clause	31. Assignments
9. Patents	32. Mutual Responsibility of Contractors
10. Surveys, Laws and Regulations	33. Separate Contracts
11. Contractor's Obligations	34. Subcontracting
12. Weather Conditions	35. Engineer's Authority
13. Protection of Work and Property, Emergency	36. Stated Allowances
14. Interpretations	37. Use of Premises and Removal of Debris
15. Reports, Records and Data	38. Quantities of Estimate
16. Superintendence by Contractor	39. Rights-of-Way and Suspension of Work
17. Changes in Work	40. Warranty for One Year After Completion of Contract
18. Extras	41. Notice and Service Thereof
19. Time for Completion and Liquidated Damages	42. Required Provisions Deemed Inserted
20. Correction of Work	43. Protection of Lives and Health
21. Subsurface Conditions Found Different	44. Wages and Overtime Compensation
22. Claims for Extra Cost	45. Prohibited Interests
23. Right of Owner to Terminate Contract	46. Conflicting Conditions
	47. Indemnification

2. DEFINITIONS. The following terms as used in this contract are respectively defined as follows:

- (a) Contractor. A person, firm or corporation with whom the contract is made by the Owner.
- (b) Subcontractor. A person, firm or corporation supplying labor and materials, or only labor, for work at the site of the project for and under separate contract or agreement with the Contractor.

- (c) Work on or at the Project. Work to be performed at the location of the project, including the transportation of materials and supplies to or from the location of the project by employees of the Contractor and any Subcontractor.
3. ADDITIONAL INSTRUCTIONS AND DETAIL DRAWINGS. The Contractor will be furnished additional instructions and detail drawings as necessary to carry out the work included in the Contract. The additional drawings and instructions thus supplied to the Contractor will coordinate with the Contract Documents and will be so prepared that they can be reasonably interpreted as part thereof. The Contractor shall carry on the work in accordance with the additional detail drawings and instructions. The Contractor and the Engineer will prepare jointly:
- (a) A schedule fixing the dates at which special detail drawings will be required; such drawings, if any, to be furnished by the Engineer in accordance with said schedule; and
- (b) A schedule fixing the respective dates for the submission of shop drawings, the beginning of manufacture, testing and installation of materials, supplies, and equipment, and the completion of the various parts of the work; each such schedule to be subject to change from time to time in accordance with the progress of the work.
4. SHOP DRAWINGS AND SAMPLES. Submit to the Engineer for approval, in accordance with the requirement of Section 01340.
- 4.1 Samples. Contractor shall also submit to the Engineer for approval, all samples required by Section 01340. All samples will have been checked by and stamped with the approval of the Contractor, identified clearly as to material, manufacturer, any pertinent catalog numbers and the use for which intended.
- 4.2 Deviations. At the time of each submission, Contractor shall in writing call the Engineer's attention to any deviations that the Shop Drawings or samples may have from the requirements of the Contract Document.
- 4.3 Engineer's Review. Engineer will review and approve with reasonable promptness Shop Drawings and samples, but his review and approval shall be only for conformance with the design concept of the project and for compliance with the information given in the Contract Documents. The approval of a separate item as such will not indicate approval of the assembly in which the item functions. Contractor shall make any corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and resubmit new samples until approved. Contractor shall direct specific attention in writing or on resubmitted Shop Drawings to revisions other than the corrections called for by Engineer on previous submissions. Contractor's stamp of approval on any Shop Drawing or sample shall constitute a representation to Owner and Engineer that Contractor has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers and similar data or he assumes full responsibility for doing so, and that he has reviewed or coordinated each Shop Drawing or sample with the requirements of the work and Contract Documents.
- 4.4 Contractor's Records. Where a Shop Drawing or sample submission is required by the Specifications, no related work shall commence, until, the submission has been approved by Engineer. A copy of each approved shop drawing and each approved sample shall be kept in good order by Contractor at the site and shall be available to Engineer.

4.5 Contractor's Responsibility. Engineer's approval of Shop Drawings or sample shall not relieve Contractor from his responsibility for any deviations from the requirements of the Contract Documents unless Contractor has in writing called the Engineer's attention to such deviation at the time of submission and Engineer has given written approval to the specific deviation, nor shall any approval by Engineer relieve Contractor from responsibility for errors or omissions in the Shop Drawings.

5. MATERIALS, SERVICES AND FACILITIES shall be furnished by the Contractor.

(a) It is understood that except as otherwise specifically stated in the Contract Documents, the Contractor shall provide and pay for all materials, labor, tools, equipment, water, gas lights, power, transportation, superintendence, taxes, insurance, temporary construction of every nature, and all other services and facilities of every nature whatsoever necessary to execute, complete and deliver the work within the specified time.

(b) Any work necessary to be performed after regular working hours, on Sundays, or legal holidays, shall be performed without additional expense to the Owner.

6. CONTRACTOR'S TITLE TO MATERIALS. No materials or supplies for the work shall be purchased by the Contractor or by any subcontractor 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 that he has good title to all materials and supplies used by him in the work, free from all liens, claims or encumbrances.

7. INSPECTION AND TESTING OF MATERIALS. Unless otherwise specifically provided for in the specifications, the inspection and testing of material and finished articles to be incorporated in the work at the site shall be made by bureaus, laboratories, or agencies approved by the Owner. The cost of such inspection and testing shall be paid by the Contractor.

7.1 Certification by Contractor. Where the detailed specifications call for certified copies of mill or shop tests to establish conformance of certain materials with the specifications, it shall be the responsibility of the Contractor to assure delivery of such certifications to the Owner. No materials or finished articles shall be incorporated in the work until such materials and finished articles have passed the required tests. The Contractor shall promptly segregate and remove rejected material and finished articles from the site of the work.

7.2 Guaranty. The testing and approval of materials by the laboratory, or laboratories, shall not relieve the Contractor of any of his obligations to fulfill his contract and guarantee of workmanship and materials as called for in paragraph entitled "General Warranty for One Year After Completion of Contract" herein. The Contractor may, at his option and at his own expense, cause such other tests to be conducted as he may deem necessary to assure suitability, strength and durability of any material or finished article.

8. "OR EQUAL" CLAUSE. The phrase "or equal" shall be construed to mean that material or equipment will be acceptable only when, in the judgment of the Engineer, they are composed of parts of equal quality, or equal workmanship and finish, designed and constructed to perform or accomplish the desired result as efficiently as the indicated brand, pattern, grade, class, make or model. Written approval will be obtained from the Engineer prior to installation.

9. PATENTS. The Contractor shall hold and save the Owner and 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 unpatented invention, process, article, or appliance manufactured or used in the performance of the contract, including its use by the Owner, unless

otherwise specifically stipulated in the Contract Documents. If the Contractor uses any design, device or material covered by letter, patent, or copyright, he shall provide for such use by suitable agreement with the Owner of such patented or copyrighted design, device or material. It is mutually agreed and understood that, with exception, the contract prices shall include all royalties or costs arising from the use of such design, device or materials, in any way involved in the work. The Contractor and/or his sureties shall indemnify and save harmless the Owner of the project from any and all claims for infringements by reason of the use of such patented or copyrighted design, device or materials or any trademark or copyright in connection with work agreed to be performed under this contract, and shall indemnify the Owner for any cost, expense or damage which it may be obliged to pay by reason of such infringement at any time during the prosecution of the work or after completion of the work.

10. SURVEYS, LAWS AND REGULATIONS. The Contractor shall comply with the following:

10.1 Construction staking shall be in accordance with the requirements of Section 01050 entitled "Field Engineering".

10.2 Laws and Regulations. The Contractor shall keep himself fully informed of all laws, ordinances and regulations of State, City and County in any manner affecting those engaged or employed in the work, or the materials used in the work, or in any way affecting the conduct of the work, and of all orders and decrees of bodies or tribunals having any jurisdiction or authority over same. If any discrepancy or inconsistency should be discovered in this contract, or in the drawings or specifications herein referred to, in relation to any such law, ordinance, regulation, order or decree, he shall forthwith report the same in writing to the Owner. He shall, at all times, himself observe and comply with all such existing and future laws, ordinances and regulations (to the extent that such requirements do not conflict with Federal laws or regulations) and shall protect and indemnify the Owner and its agents against any claims or liability arising from or based on the violation of any such law, ordinance, regulation, order or decree, whether by himself or by his employees.

11. CONTRACTOR'S OBLIGATIONS. The Contractor shall, in good workmanlike manner, do and perform all work and furnish all supplies and materials, machinery, equipment, facilities and means, except as herein otherwise expressly specified, necessary or proper to perform and complete all the work required by this contract, within the time herein specified, in accordance with provisions of this contract and said specifications, and in accordance with the plans and drawings covered by this contract and any and all supplemental plans and drawings and in accordance with the directions of the Engineer as given from time to time during the progress of the work. He shall furnish, erect, maintain and remove such construction plant and such temporary works as may be required. The Contractor shall observe, comply with, and be subject to all terms, conditions, requirements and limitation of the contract and specifications, and shall do, carry on and complete the entire work to the satisfaction of the Engineer and the Owner.

12. WEATHER CONDITIONS. In the event of temporary suspension of work or during inclement weather, or whenever the Engineer shall direct, the Contractor will, and will cause his subcontractors to, protect carefully his and their work and materials against damage or injury from the weather. If, in the opinion of the Engineer, any work or materials shall have been damaged or injured by reason of failure on the part of the Contractor or any of his Subcontractors to so protect its work, such materials shall be removed and replaced at the expense of the Contractor.

13. PROTECTION OF WORK AND PROPERTY, EMERGENCY. The Contractor shall at all times safely guard the Owner's property from injury or loss in connection with this contract. He shall at all times safely guard and protect his own work and that of adjacent property from damage. The

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Contractor shall replace or make good any such damage, loss or injury unless such be caused directly by errors contained in the contract or by the Owner or by his duly authorized representatives. In case of emergency which threatens loss or injury of property and/or safety of life, the Contractor will be allowed to act, without previous instructions from the Engineer, in a diligent manner. He shall notify the Engineer immediately thereafter. Any claim for compensation by the Contractor due to such extra work shall be promptly submitted to the Engineer for approval. Where the Contractor has not taken action but has notified the Engineer of an emergency threatening injury to persons or damage to the work of any adjoining property, he shall act as instructed or authorized by the Engineer. The amount of reimbursement claimed by the Contractor on account of any emergency action shall be determined in the manner provided in paragraph entitled "Changes in Work" of these specifications.

14. INTERPRETATIONS. If any person contemplating submitting a bid for the proposed contract is in doubt as to the true meaning of any part of these proposed contract documents, he may submit to the Engineer a written request for an interpretation thereof. The person submitting the request will be responsible for its prompt and actual delivery. Any interpretation of such documents will be made only by addendum duly issued, and a copy of such addendum will be mailed or delivered to each person receiving a set of such documents. The Owner will not be responsible for any other explanation or interpretation of such documents which anyone presumes to make on behalf of the Owner before expiration of the ultimate time set for the receipt of bids.
15. REPORTS RECORDS AND DATA. The Contractor shall submit to the Owner such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data as the Owner may request concerning work performed or to be performed under this contract.
16. SUPERINTENDENCE BY CONTRACTOR. The Contractor shall employ only competent and skilled men on the work. The Contractor shall have competent Superintendent or Foreman present at all times when the work is in progress, who shall have full authority to act for the Contractor. It is understood that such representative shall be acceptable to the Engineer and shall be one who can be continued in that capacity for the particular job involved unless he ceases to be on the Contractor's payroll. The Contractor shall, upon demand from the Engineer, immediately remove any superintendent, foreman or workman whom the Engineer may consider incompetent or undesirable.
17. CHANGES IN WORK. No changes in the work covered by the approved contract documents shall be made without having prior written approval of the Owner. Charges or credits for the work covered by the approved change shall be determined by one or more, or a combination of, the following methods:
 - (a) Unit bid prices previously approved.
 - (b) An agreed lump sum.
 - (c) The actual cost of:
 1. Labor, including foremen.
 2. Materials entering permanently into the work.
 3. The ownership or rental cost of construction plant and equipment during the time of use on the extra work.
 4. Power and consumable supplies for the operation of power equipment.
 5. Insurance.
 6. Social security and old age and unemployment contributions.

To the cost under (c) there shall be added a fixed fee to be agreed upon but not to exceed 15 percent of the estimated cost of the work. The fee shall be compensation to cover the cost of supervision, overhead, bond, profit and any other general expenses.

18. EXTRAS. Without invalidating the contract, the Owner may order extra work or make changes by altering, adding to or deducting from the work, the contract sum being adjusted accordingly, and the consent of the surety being first obtained where necessary or desirable. All the work of the kind bid upon shall be paid for at the price stipulated in the proposal, and no claims for any extra work or materials shall be allowed unless the work is ordered in writing by the Owner, or the Engineer acting officially for the Owner, and the price is stated in such order. Extra work shall be performed only upon the execution of authorized change orders as set forth in the preceding paragraph.
19. TIME FOR COMPLETION AND LIQUIDATED DAMAGES. It is hereby understood and mutually agreed by and between the Contractor and the Owner that the date of beginning and the time for completion as specified in the contract of the work to be done hereunder are essential conditions of this contract; and it is further mutually understood and agreed that the work embraced in this contract shall be commenced on a date to be specified in the Notice to Proceed.
- 19.1 Regular Prosecution of Work. The Contractor agrees that said work shall be prosecuted regularly, diligently and uninterruptedly at such rate of progress as will insure full completion thereof within the time specified. It is expressly understood and agreed, by and between the Contractor and the Owner, that the time for completion of the work described herein is a reasonable time for completion of same, taking into consideration the average climatic range and usual industrial conditions prevailing in this locality.
- 19.2 Liquidated Damages. If the Contractor shall neglect, fail, or refuse to complete the work within the time herein specified, or any proper extensions thereof granted by the Owner, then the Contractor does hereby agree, as a part consideration for the awarding of this contract, to pay to the Owner the amount specified in the contract not as a penalty but as liquidated damages for such breach of contract as hereinafter set forth, for each and every calendar day that the Contractor shall be in default after the time stipulated in the contract for completing the work. The said amount is fixed and agreed upon by and between the Contractor and the Owner because of the impracticality and extreme difficulty of fixing and ascertaining the actual damages the Owner would in such event sustain, and said amount is agreed to be the amount of damages which the Owner would sustain and said amount shall be retained from time to time by the Owner from current periodical estimates.
- 19.3 Extensions of Time for Completion. It is further agreed that time is of the essence of each and every portion of this contract and of the specifications wherein a definite and certain length of time is fixed for the performance of any act whatsoever; and where under the contract an additional time is allowed for the completion of any work, the new time limit fixed by such extension shall be of the essence of this contract. Provided, that the Contractor shall not be charged with liquidated damages or any excess cost when the delay in completion of the work is due:
- (a) To any preference, priority or allocation order duly issued by the Government.
 - (b) To unforeseeable cause beyond the control and without the fault or negligence of the Contractor including, but not restricted to, acts of the public enemy, acts of the Owner, acts of another contractor in the performance of a contract with the Owner; fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, hurricanes, tornadoes; and

- (c) To any delays of subcontractors or suppliers occasioned by any of the causes specified in subsections (a) and (b) of this article.

Provided, further that the Contractor shall, within seven (7) days from the beginning of such delay, unless the Owner shall grant a further period of time prior to the date of final settlement of the contract, notify the Owner in writing of the causes of delay, who shall ascertain the facts and extent of delay and notify the Contractor within a reasonable time of its decision in the matter, and grant such extension of time as the Owner shall deem suitable and just.

Normal weather conditions for the project area are taken into consideration in the time for completion of the contract; therefore, no extension of time will be extended for normal weather conditions, with the exception of hurricanes and tornadoes.

20. CORRECTION OF WORK. All work, all materials, whether incorporated in the work or not, all processes of manufacturer, and all methods of construction, shall be at all times and places subject to the inspection of the Engineer, who shall be the final judge of the quality and suitability of the work, materials, processes of manufacture, and methods of construction of the purposes for which they are used. Should they fail to meet his approval, they shall be forthwith reconstructed, made good, replaced and/or corrected, as the case may be, by the Contractor at his own expense. Rejected material shall immediately be removed from the site. If, in the opinion of the Engineer, it is undesirable to replace any defective or damaged materials or to reconstruct or correct any portion of the work injured or not performed in accordance with the contract documents, the compensation to be paid to the Contractor hereunder shall be reduced by such amount as, in the judgment of the Engineer, shall be equitable.
21. SUBSURFACE CONDITIONS FOUND DIFFERENT. Should the Contractor encounter subsurface and/or latent conditions at the site materially differing from those shown on the plans or indicated in the specifications, he shall immediately give notice to the Engineer of such conditions before they are disturbed. The Engineer will thereupon promptly investigate the conditions, and if he finds that they materially differ from those shown on the plans or indicated in the specifications, he will at once make such changes in the plans and/or specifications as he may find necessary; any increase or decrease of cost resulting from such changes to be adjusted in the manner provided in paragraph 17 of these specifications.
- (a) Where no specific subsurface conditions are indicated or specified, no increase in cost will be considered in regards to subsurface conditions encountered.
22. CLAIMS FOR EXTRA COSTS. No claim for extra work or cost shall be allowed unless the same was done in pursuance of a written order of the Engineer, as aforesaid, and the claim presented with the first estimate after the changes or extra work is done. When work is performed under the terms of subparagraph 17(c) of these specifications, the Contractor shall furnish satisfactory bills payrolls and vouchers covering all items of cost and when requested by the Owner, give the Owner access to accounts relating thereto.
23. RIGHT OF OWNER TO TERMINATE CONTRACT. In the event that any of the provisions of this contract are violated by the Contractor or by any of his subcontractors, the Owner may serve written notice upon the Contractor and the surety of its intention to terminate the contract, such notices to contain the reasons for such intention to terminate the contract, and unless within 10 days after the serving of such notice upon the Contractor, such violation or delay shall cease and satisfactory arrangement or correction be made, the contract shall, upon the expiration of said 10 days, cease and terminate. In the event of any such termination, the Owner shall immediately serve notice thereof upon the surety and the Contractor, and the surety shall have the right to take over and perform the contract; provided, however, that if the surety does not commence performance thereof within 10 days from the date of the mailing to

such surety of notice of termination, the Owner may take over the work and prosecute same to completion by the contract or by force account for the account and at the expense of the Contractor, and the Contractor and his surety shall be liable to the Owner for any excess cost occasioned thereby, and in such event the Owner may take possession of and utilize in completion the work such materials, appliances and plant as may be on the site of the work and necessary therefore. If the Contractor should die, be declared an incompetent, be declared bankrupt or insolvent, make an assignment for the benefit of creditors during the term of his contract, the Owner may terminate the contract in the manner and under the procedure set forth above with the exception that no notices to the Contractor shall be required, but in lieu thereof the Owner must make a reasonable effort to notify the estate of the Contractor, his guardian, assignee, or legal representative of the intention to terminate and fact of termination, if there is any such guardian, assignee, or legal representative at the time the Owner desires to terminate.

24. 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 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 the Contractor in accordance with the progress schedule.

24.1 Contractor's Estimate. The Contractor shall also furnish:

- (a) A detailed construction schedule in accordance with Section 01310 of these Contract Documents.
- (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 for determining the basis of partial payments and will not be considered as fixing a basis for addition to or deductions from the contract price.

24.2 Equipment Delivery Schedule. The Contractor shall also prepare a schedule of anticipated shipping dates for materials and equipment. It is intended that equipment and materials be so scheduled as to arrive at the job site just prior to time for installation to prevent excessive materials on hand for inventory and the necessity for extensive storage facilities at the job site.

25. PAYMENTS TO CONTRACTOR shall be made according to the following:

- (a) The Owner will make payments to the Contractor within thirty (30) days upon receipt of a duly certified and approved estimate of the work performed during the preceding calendar month under this contract. To ensure the proper performance of this contract, the Owner will retain a portion of each estimate, in accordance with the following, until final completion and acceptance of all work are covered by this contract.
 - 1. Retention of 10% of payment claimed until construction is fully completed; a final permit to operate has been issued by SCDHEC and contractor compliance with Section 01700.
- (b) In preparing estimates, the material delivered on the site and preparatory work done may be taken into consideration.
- (c) All material and work covered by partial payments shall thereupon become the sole property of the Owner, but this provision shall not be construed as relieving

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the Contractor from the sole responsibility for the care and protection of materials and work upon which payments have been made or the restoration of any damaged work, or as a waiver of the right of the Owner to require the fulfillment of all the terms of the contract.

25.1 Owner's Right to Withhold Certain Amounts and Make Application Thereof. The Contractor agrees that he will indemnify and save the Owner harmless from all claims growing out of the lawful demands of subcontractors, laborers, workmen, mechanics, materialmen, and furnishers of machinery and parts thereof, equipment, power tools, and all supplies, including commissary, incurred in the furtherance of the performance of this contract. The Contractor shall, at the Owner's request, furnish satisfactory evidence that all obligations of the nature hereinabove designated have been paid, discharged, or waived. If the Contractor fails so to do, then the Owner may, after having served written notice on the contractor, either pay unpaid bills, of which the Owner has written notice, direct, or withhold from the Contractor's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the Contractor shall be resumed in accordance with the terms of this contract, but in no event shall the provisions of this sentence be construed to impose any obligations upon the Owner to either the Contractor or his surety. In paying any unpaid bills of the Contractor, the Owner shall be deemed the agent of the Contractor, and any payment so made by the Owner shall be considered as a payment made under the contract by the Owner to the Contractor, and the Owner shall not be liable to the Contractor for any such payment made in good faith.

26. ACCEPTANCE OF WORK AND FINAL PAYMENT. Before final acceptance of the work and payment to the Contractor of the percentage retained by the Owner, the following requirements shall be complied with:

- (a) Final Inspection. Upon notice from the Contractor that his work is completed, the Engineer will make a final inspection of the work and shall notify the Contractor of all instances where his work fails to comply with the contract drawings and specifications, as well as any defects he may discover. The Contractor shall immediately make such alterations as are necessary to make the work comply with the contract drawings and specifications, and to the satisfaction of the Engineer.
- (b) Operating Test. After the alterations for compliance with the contract drawings and specifications have been made, and before acceptance of the whole or any part of the work, it shall be subjected to test to determine that it is in accordance with the contract drawings and specifications. The Contractor shall maintain all work in first class condition for a thirty (30) day operating period after the work has been completed as a whole, the final inspection has been made, and the Engineer has notified the Contractor in writing that the work has been finished to his satisfaction. The retained percentage as provided herein will not become due or payable to the Contractor until after the thirty (30) day operating period has expired.
- (c) Cleaning Up. Before the work is considered as complete, all rubbish and unused material due to or connected with the construction must be removed and the premises left in a condition satisfactory to the Owner. Streets, curbs, crosswalks, pavements, sidewalks, fences and other public and private property disturbed or damaged should be restored to their former condition. Final acceptance will be withheld until such work is finished.

- (d) Liens. Final acceptance of the work will not be granted and the retained percentage will not be due or payable until the Contractor has furnished the Owner proper and satisfactory evidence under oath that all claims for labor and material employed or used in the construction of the work under this contract have been settled, and that no legal claims can be filed against the Owner for such labor or material.
 - (e) Final Estimate. Upon completion of all cleaning up, alterations and repairs required by the final inspection or operating test, the satisfactory completion of the operating test, and upon submitting proper and satisfactory evidence to the Owner that all claims have been settled, the Contractor shall then prepare his final estimate. After review and approval of the final estimate by the Engineer and the Owner, the payment shall then become due.
- 27. ACCEPTANCE OF FINAL PAYMENT AS RELEASE. The acceptance by the Contractor of final payment shall be and shall operate as a release to the owner of all claims and all liability to the Contractor for all things done or furnished in connection with this work and for every act and neglect of the Owner and others relating to or arising out of this work. No payment, final or otherwise, shall operate to release the Contractor or his sureties from any obligations under this Contract or his sureties from any obligations under this contract or the performance and payment bond.
- 28. PAYMENTS BY CONTRACTOR. The Contractor shall pay:
 - (a) For all transportation and utility services not later than the 20th day of the calendar month following that in which services are rendered;
 - (b) For all materials, tools, and other expendable equipment to the extent of ninety (90) percent of the cost thereof not later than the 20th day of the calendar month following that in which such materials, tools, and equipment are delivered at the site of the project, and the balance of the cost thereof not later than the 30th day following completion of that part of the work in or on which such materials, tools, and equipment are incorporated or used; and
 - (c) To each of his subcontractors not later than the 5th day following each payment to the Contractor, the respective amounts allowed the Contractor on account of the work performed by his subcontractors to the extent of each subcontractor's interest therein.
- 29. INSURANCE. The Contractor shall procure and shall maintain during the life of this contract, whether such operation be by himself or by a subcontractor or anyone directly or indirectly employed by either of them, such insurance as required by statute and/or ordinance to adequately protect the Owner from any claims or damages, including bodily injury or death, which may arise from them during operations under this contract.
 - 29.1 Limits of Liability. Insurance shall be obtained for not less than the limits of liability as specified in Section 00800 entitled Supplemental General Conditions.
 - 29.2 Certificates of Insurance. The Contractor shall furnish the Owner, if requested, certificates showing the type, amount, class of operations covered, effective dates and dates of expiration of the policies. Such certificates shall contain substantially the following statement: "The insurance covered by this certificate will not be cancelled or materially altered except after 30 days written notice has been received by the Owner".

30. CONTRACT SECURITY. The Contractor shall furnish a 100 percent performance bond and a 100 percent payment bond as security for the faithful performance of this contract, as security for the payment of all persons performing labor on the project under this contract and furnishing materials in connection with this contract. The performance bond and payment bond shall be in separate instruments. Before the final acceptance, each bond must be approved by the Owner.
31. ASSIGNMENTS. The Contractor shall not assign the whole or any part of this contract or any moneys due or to become due hereunder without written consent of the Owner. In case the Contractor assigns all or any part of any moneys due or to become due under this contract, the instrument of assignment shall contain a clause substantially to the effect that is agreed that the right of the assignee in and to any moneys due or to become due to the Contractor shall be subject to prior claims of all persons, firms and corporations for services rendered or materials supplied for the performance of the work called for in this contract.
32. MUTUAL RESPONSIBILITY OF CONTRACTORS. If through acts of neglect on the part of the Contractor, any other contractor or any subcontractor shall suffer loss or damage on the work, the Contractor agrees to settle with such other contractor or subcontractor by agreement or arbitration. If such other contractor or subcontractor shall assert any claim against the Owner on account of any damage alleged to have been sustained, the Owner shall notify the Contractor, who shall indemnify and save harmless the Owner against any such claim.
33. SEPARATE CONTRACTS. The Contractor shall coordinate his operations with those of other contractors. Cooperation will be required in the arrangement for the storage of materials and in the detailed execution of the work. The Contractor, including his subcontractor, shall keep informed of the progress and the detail work of other contractors and shall notify the Engineer immediately of lack of progress or defective workmanship on the part of other contractors. Failure of a contractor to keep informed of the work progressing on the site and failure to give notice of lack of progress or defective workmanship by others shall be construed as acceptance by him of the status of the work as being satisfactory for proper coordination with his own work.
34. SUBCONTRACTING shall comply with the following:
- (a) The Contractor may utilize the services of specialty contractors on those parts of the work that under normal contracting practices are performed by specialty subcontractors.
 - (b) The Contractor shall not award any work to any subcontractor without prior written approval of the Owner, which approval will not be given until the Contractor submits to the Owner a written statement concerning the proposed award to the subcontractor, which statement shall contain such information as the Owner may require.
 - (c) The Contractor shall be as fully responsible to the Owner for the acts and omissions of his subcontractors, and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons employed by him.
 - (d) The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind subcontractors to the Contractor by the terms of the General Conditions and other contract documents insofar as applicable to the work of subcontractors and to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise over the Contract under any provisions of the contract documents.

- (e) Nothing contained in this contract shall create any contractual relation between any subcontractor and the Owner.

35. ENGINEER'S AUTHORITY. The Engineer shall determine the amount, quality, acceptability and fitness of the several kinds of work and materials which are to be paid for under this contract and shall decide all questions which may arise in relation to said work and the construction thereof. The Engineer's estimates and decisions shall be final and conclusive, except as herein otherwise expressly provided. In case any question shall arise between the parties hereto relative to said contract or specifications, the determination or decision of the Engineer shall be a condition precedent to the right of the Contractor to receive any money or payment for work under this contract affected in any manner or to any extent by such question.

35.1 Interpretation of Drawings and Specifications. The Engineer shall decide the meaning and intent of any portion of the specifications and of any plans or drawings where the same may be found obscure or be in dispute. Any differences or conflicts in regard to their work that may arise between the Contractor under this contract and other contractors performing work for the Owner shall be adjusted and determined by the Engineer.

36. STATED ALLOWANCES. (Not Applicable)

37. USE OF PREMISES AND REMOVAL OF DEBRIS. The Contractor expressly undertakes at his own expense:

- (a) To take every precaution against injuries to persons or damage to property.
- (b) To store his apparatus, materials, supplies and equipment in such orderly fashion at the site of the work as will not unduly interfere with the progress of his work or the work of any other contractors.
- (c) To place upon the work or any part thereof only such loads as are consistent with the safety of that portion of the work.
- (d) To clean up frequently all refuse, rubbish, scrap materials, and debris caused by his operations, to the end that at all times the site of the work shall present a neat, orderly and workmanlike appearance.
- (e) Before final payment to remove all surplus material, false work, temporary structures, including foundations thereof, plant of any description and debris of every nature resulting from his operations, and to put the site in a neat, orderly condition.
- (f) To effect all cutting, fitting or patching of his work required to make the same conform to the plans and specifications, and, except with the consent of the Engineer, not to cut or otherwise alter the work of any other contractor.

38. QUANTITIES OF ESTIMATE. The estimated quantities of work to be done and materials to be furnished under this contract, shown in any of the documents, including the proposal, are given for use in comparing bids, and the right is especially reserved except as herein otherwise specifically limited, to increase or diminish them as may be deemed reasonably necessary or desirable by the Owner to complete the work contemplated by this contract, and such increase or diminution shall in no way vitiate this contract, nor shall any such increase or diminution give cause for claims or liability for damages.

39. RIGHT-OF-WAY AND SUSPENSION OF WORK. The Owner shall furnish all land and rights-of-way necessary for the carrying out of this contract and the completion of the work herein contemplated, and will use due diligence in acquiring said land and rights-of-way as speedily as possible. But it is possible that all lands and rights-of-way may not be obtained as herein contemplated before construction begins, in which event the Contractor shall begin his work upon such land and rights-of-way as the Owner may have previously acquired, and no claim for damages whatsoever will be allowed by reason of the delay in obtaining the remaining lands and rights-of-way.

Should the Owner be prevented or enjoined from proceeding with the work, or from authorizing its prosecution, either before or after the commencement, by reason of any litigation or by reason of its ability to procure any lands or rights-of-way for said work, the Contractor shall not be entitled to make or assert claim for damage by reason of said delay or to withdraw from the contract except by consent of the Owner; but time for completion of the work will be extended to such time as the Owner determines will compensate for the time lost by such delay, such determination to be set forth in writing.

40. GENERAL WARRANTY FOR ONE YEAR AFTER COMPLETION OF CONTRACT. For a period of at least one year after the completion of the contract, the Contractor warrants the fitness and soundness of all work done and materials and equipment put in place under the contract, and neither the final certificate of payment nor any provision in the Contract Documents nor partial or entire occupancy of the premises by the Owner shall constitute an acceptance of work not done in accordance with the Contract Documents or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship. The Contractor shall remedy any defects in the work and pay for any damage to other work resulting there from, which shall appear within a period of one year from the date of final acceptance of the work, unless a longer period is specified. The Owner will give notice of observed defects with reasonable promptness.

41. NOTICE AND SERVICE THEREOF. Any notice to any Contractor from the Owner relative to any part of this contract shall be in writing and considered delivered and the service thereof completed, when said notice is posted by registered mail to said Contractor or his authorized representative on the work, or is deposited in the regular United States Mail in a sealed, postage prepaid envelope and the receipt thereof is acknowledged by the Contractor.

41.1 Owner's Notice. All papers required to be delivered to the Owner shall be delivered as indicated in Section 00800 entitled Supplemental General Conditions.

42. 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 or correction.

43. PROTECTION OF LIVES AND HEALTH. In order to protect the lives and health of his employees under the contract, the Contractor shall comply with all pertinent provisions of the "Manual of Accident Prevention in Construction" issued by the Associated General Contractors of America, Inc., and shall maintain an accurate record of all cases of death, occupational disease, and injury requiring medical attention or causing loss of time from work, arising out of and in the course of employment on work under the contract. The Contractor alone shall be responsible for the safety, efficiency and adequacy of his plant, appliances and methods, and for any damage that may result from their failure or their improper construction, maintenance or operation.

44. WAGES AND OVERTIME COMPENSATION. The Contractor and each of his subcontractors shall comply with all applicable State and local laws or ordinances with respect to the hours worked by laborers and mechanics engaged in work on the project and with respect to compensation for overtime. The Contractor shall further comply with the requirements as set forth in Sections 00801 and 00802 of these documents.
45. PROHIBITED INTERESTS. 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. No officer, employee, architect, attorney, engineer, or inspector of 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 hereof, any material supply contract, subcontract, insurance contract, or any other contract pertaining to the project.
46. CONFLICTING CONDITIONS. Any provisions in any of the Contract Documents which maybe in conflict or inconsistent with any of the paragraphs in these General Conditions shall be void to the extent of such conflict or inconsistency.
47. INDEMNIFICATION
- 47.1 The CONTRACTOR will indemnify and hold harmless the OWNER, the ENGINEER and their agents and employees from and against all claims, damages, losses and expenses including attorney's fees arising out of or resulting from the performance of the WORK, provided that any such claims, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property including the loss of use resulting there from; and is caused in whole or in part by any negligent or willful act of omission of the CONTRACTOR and SUBCONTRACTOR, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.
- 47.2 In any and all claims against the OWNER or the ENGINEER, or any of their agents or employees, by an employee of the CONTRACTOR, any SUBCONTRACTOR, anyone directly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by limitation on the amount or type of damages, compensation or benefits payable by or for the CONTRACTOR or any SUBCONTRACTOR under workmen's compensation acts, disability benefit acts or other employee benefits acts.
- 47.3 The obligation of the CONTRACTOR under this paragraph shall not extend to the liability of the ENGINEER, its agents or employees arising out of the preparation or approval of maps, drawings, opinions, reports, surveys, change orders, design or specifications.

END OF SECTION

SECTION 00800

SUPPLEMENTAL GENERAL CONDITIONS

A. ENUMERATION OF PLANS, SPECIFICATIONS AND ADDENDA

1. The plans, specifications and addenda which form a part of this contract as set forth in Paragraph 1 of the General Conditions, Contract and Contract Documents are enumerated in the Table of Contents and Section 00851 - Drawings Index.

B. CONTRACTOR'S AND SUBCONTRACTOR'S INSURANCE

1. As required under Paragraph 29 of the General Conditions, the CONTRACTOR shall not commence WORK under this Contract until he has obtained all the insurance required under this paragraph and such insurance has been approved by the OWNER, nor shall the CONTRACTOR allow any SUBCONTRACTOR to commence WORK on his Subcontract until all similar insurance required of the SUBCONTRACTOR has been so obtained and approved.
2. Unless otherwise specified in this Contract, the CONTRACTOR shall, at its sole expense, maintain in effect at all times, during the performance of WORK, insurance coverage with limits not less than those set forth below with insurers and under forms of policies satisfactory to OWNER.
3. The CONTRACTOR shall deliver Certificates of Insurance to the ENGINEER no later than ten (10) days after award of the Contract but in any event, prior to execution of the Contract by the OWNER and prior to commencing WORK on the site as evidence that policies providing such coverage and limits of insurance are in full force and effect.
 - a. Certificates shall provide that not less than thirty (30) days advance notice will be given in writing to the OWNER prior to cancellation, termination or material alteration of said policies of insurance.
 - b. Certificates shall identify on their faces the PROJECT NAME and the ENGINEER'S PROJECT NUMBER.
4. Additional Insured: The Commercial General Liability and Excess Liability (Umbrella) insurance policies shall be endorsed to include the OWNER and ENGINEER as additional insured. Such insurance shall be primary and not be contributory with any other insurance maintained by the OWNER or ENGINEER.
5. The OWNER is not maintaining any insurance on behalf of the CONTRACTOR covering against loss or damage to the WORK or to any other property of the CONTRACTOR unless otherwise specifically stated herein and as may be described by appendix hereto. In the event the CONTRACTOR maintains insurance against physical loss or damage to the CONTRACTOR'S construction equipment and tools, such insurance shall include an insurer's waiver of rights of subrogation in favor of OWNER.

6. The CONTRACTOR shall indemnify the OWNER and the ENGINEER as stated in Part 47 of Section 00700.

7. Insurance Requirements:

- a. Commercial General Liability Insurance: The CONTRACTOR shall take out and maintain during the life of the Contract such commercial general liability insurance as shall protect him from claims for damage for bodily injury, including accidental death, as well as from claims for property damage, which may arise from operations under this contract whether such operations are by himself or by any SUBCONTRACTOR or by anyone directly or indirectly employed by either of them. The amount of such insurance shall be not less than the following:

General Aggregate	\$2,000,000.00
Products - Complete/Operations Aggregate	\$2,000,000.00
Personal and Advertising Injury	\$1,000,000.00
Each Occurrence	\$1,000,000.00
Fire Damage (Any one fire)	\$50,000.00
Medical Expenses (Any one person)	\$5,000.00

- 1) The General Aggregate listed above shall be for this project only.
- 2) Special Hazards: The CONTRACTOR'S and his SUB-CONTRACTOR'S General Liability Insurance shall provide adequate protection against use of explosives, collapse, and underground hazards. Each detonation of blasting shall be considered a single occurrence.

- b. Comprehensive Automobile Liability Insurance:

- 1) Includes coverage for all owned, hired and non-owned automobiles.
- 2) The combined single limit of liability shall not be less than the following:

Any One Accident or Loss	\$1,000,000.00
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- c. Excess Liability (Umbrella) Insurance:

- 1) CONTRACTOR shall carry and maintain Combined Excess Liability (Umbrella) insurance for a limit not less than the following:

Each Occurrence	\$2,000,000.00
Aggregate	\$2,000,000.00

- d. Worker's Compensation: The insurance required by this Section shall be written for not less than the following or greater if required by law:

- 1) Statutory benefits as provided by South Carolina Law.
- 2) Employers' Liability:

Each Accident	\$500,000.00
Disease - Policy Limit	\$500,000.00
Disease - Each Employee	\$500,000.00

- e. Builders Risk Insurance: The CONTRACTOR shall purchase and maintain an "all risk" or special perils form builder's risk policy issued in the name of the CONTRACTOR, OWNER and all SUBCONTRACTORS for the full contract value of the insurable portions of the WORK. This policy shall contain a provision that in the event of payment of any loss or damage, the insurer will have no rights of recovery against any of the parties named as insureds or additional insureds.
- f. Flood Insurance: The CONTRACTOR is required to carry flood insurance for projects located in designated flood hazard areas in which Federal Flood Insurance is available.
- g. Earthquake Insurance: The CONTRACTOR is required to carry earthquake insurance for the full contract value of insurable portions of the WORK.

C. ABBREVIATIONS AND DEFINITIONS

- 1. Abbreviations used in these Specifications refer to the following:

OWNER: Town of Blacksburg

ENGINEER: Summit Engineering Group, Inc. or their duly authorized representative

- 2. Definitions: Wherever in the specifications or upon the drawings the words "directed", "required", "permitted", "ordered", "designated", "prescribed", or words of like import are used, it shall be understood that the direction, requirement, permission, order, designation or prescription of the OWNER is intended; and similarly, the words "approved", "acceptable", "satisfactory", or words of like import shall mean approved by, or acceptable to, or satisfactory to the OWNER, unless otherwise expressly stated.

D. PHOTOGRAPHS OF PROJECT

- 1. Provide digital photos and photo index of all construction areas, prior to and after construction activities.

E. SCHEDULE OF OCCUPATIONAL CLASSIFICATIONS AND MINIMUM HOURLY WAGE RATES

- 1. Comply with Sections 00801 and 00802.

F. NOTICE AND SERVICE THEREOF

- 1. All papers required to be delivered to the OWNER shall, unless otherwise specified in writing to the CONTRACTOR, be delivered to the OWNER'S representative as indicated

below, and any notice to or demand upon the OWNER shall be sufficiently given if delivered to the office of said representative, or if deposited in the United States Mail, in a sealed postage prepaid envelope, or delivered with charges prepaid to any telegraph company for transmission, in each case addressed to the OWNER'S representative as indicated below, or to such other representative of the OWNER, or to such other address as the OWNER may subsequently specify in writing to the CONTRACTOR for such purposes. The OWNER'S representative is as follows:

Mr. Michael Smiley
Town of Blacksburg
105 S. Shelby Street
Blacksburg, SC 29702

G. CORRELATION OF PLANS AND SPECIFICATIONS

1. The contract, plans and specifications are to be interpreted as mutually explanatory or supplementary, and therefore any features shown in one and not in the other shall have the same force and effect as if shown by both, and shall be fully executed. Prior to execution of the WORK, the CONTRACTOR shall check all drawings and specifications, and shall immediately report to the ENGINEER all errors, discrepancies, conflicts and omissions discovered therein. All such errors, discrepancies, conflicts and omissions will be adjusted by the ENGINEER, and adjustment by the CONTRACTOR without prior approval shall be at his own risk. The settlement of any complications arising from such adjustments shall be made by the CONTRACTOR at his own expense and to the satisfaction of the OWNER.

H. OWNERSHIP OF DRAWINGS

1. All drawings, specifications and memoranda relating to the WORK are the property of the OWNER and are to be carefully used and returned to the OWNER upon completion or cessation of the WORK from any cause.
2. Plans and specifications to be furnished: Five (5) sets of specifications and plans will be furnished to the CONTRACTOR without charge. Additional sets can be secured from the ENGINEER upon request at cost of reproduction. The CONTRACTOR shall have available on the project site at all times one (1) copy of each of said plans and specifications.

I. ORDER OF WORK

1. The prosecution, order or sequence of the WORK shall be as approved by the ENGINEER, which approval, however, shall in no way affect the responsibility of the CONTRACTOR.

J. PHYSICAL DATA

1. The drawings, which accompany and form a part of the contract, have been prepared on the basis of surveys and inspections of the site, and are intended to present an essentially accurate indication of the physical conditions at the site. However, this shall not relieve the CONTRACTOR of the necessity for familiarizing himself with physical conditions at the site, and any discrepancies found in the drawings shall not be grounds for claims by the CONTRACTOR against the OWNER, or for non-performance of WORK specifically provided for under the contract.

K. ORGANIZATION, PLANT AND PROGRESS

1. The following is supplemental to Paragraph 16 of the General Conditions:
 - a. The CONTRACTOR shall give his personal superintendence to the WORK, or shall have a competent superintendent with authority to act for him, to the satisfaction of the ENGINEER, on the job at all times during the progress of the WORK.
 - b. The CONTRACTOR shall employ an ample force of properly experienced persons and provide construction plant properly adapted to the WORK and of sufficient capacity and efficiency to accomplish the WORK in a safe and workmanlike manner at a rate of progress satisfactory to the OWNER. All plants shall be maintained in good working order and provision shall be made for immediate emergency repairs. No reduction in the capacity of the plant employed on the WORK shall be made except by written permission of the OWNER. The measure of the capacity of the plant shall be its actual performance on the WORK to which these specifications apply. Award of this contract shall not be construed as a guaranty by the OWNER that plant listed by the CONTRACTOR for use on this contract is adequate for the performance of the WORK.
 - c. Should the CONTRACTOR fail to maintain a rate of progress which, in the opinion of the OWNER, will complete WORK within the time limit specified, the OWNER may require that additional persons working, if necessary, during additional periods or shifts, or additional plant, or both, be placed on the WORK; or a reorganization of plant layout be effected in order that the progress of the WORK be brought up to schedule and so maintained. Should the CONTRACTOR refuse or neglect so to increase the number of employees, working period, or plant, or to reorganize the plant layout in the manner satisfactory to the OWNER, the latter may proceed under the provisions of the Contract to rectify the conditions.

L. ENGINEER'S REVIEW AND CONTRACTOR'S INSPECTION

1. The WORK shall be periodically reviewed by the ENGINEER's representatives, but the presence of the ENGINEER's representatives shall not relieve the CONTRACTOR or his responsible agent of responsibility for the proper execution of the WORK.

2. The CONTRACTOR will be required to furnish at his expense such labor, organization and materials which form a part of the ordinary and usual equipment and crew of the CONTRACTOR as may be reasonably necessary in inspecting and supervising the WORK. Should the CONTRACTOR refuse, neglect or delay compliance with this requirement, the specified facilities may be furnished and maintained by the OWNER and the cost thereof will be deducted from any amounts due, or to become due, the CONTRACTOR.
3. Except as specified in this paragraph, or otherwise provided for in these specifications, all expense of inspection will be borne by the CONTRACTOR.
4. It is understood that any instruction or decision given by the ENGINEER through the Resident ENGINEER or other Representatives is to be considered the instruction or decision of the OWNER, in all cases where, under the terms of this contract, decision rests with the ENGINEER.
5. The OWNER, ENGINEER, SCDHEC, Appalachian Council of Governments, SCDOT, U.S. Environmental Protection Agency or their authorized representatives shall have access to the WORK at all times.

M. STANDARD TESTS, QUALITY AND GUARANTEES

1. Standard tests, quality and guarantees shall comply with the following:
 - a. All materials, supplies and parts and assemblies thereof, entering into the WORK to be performed under these specifications, shall be tested as specified herein or otherwise required, in conformity with the contract and according to the best modern approved methods for the particular type and class of WORK.
 - b. Unless waived in writing by the ENGINEER, all tests and trials shall be made in the presence of a duly authorized representative of the ENGINEER. When the presence of the inspector is so waived, sworn statements in duplicate of the tests made and results thereof shall be furnished to the ENGINEER by the CONTRACTOR as soon as possible after completion of tests.
 - c. Unless otherwise authorized, directed or specified, where standard published specifications of recognized authorities and organizations are mentioned, the latest revision of such specification current at the time when the WORK is executed shall govern.
 - d. All materials and equipment used in the construction of the project shall be subject to adequate inspection and testing in accordance with accepted standards. The laboratory or inspection agency shall be selected by the OWNER. The OWNER will pay for all laboratory inspection service direct and not as a part of the contract.
 - e. Materials of construction, particularly those upon which the strength and durability of the structure may depend, shall be subject to inspection and testing to establish conformance with specifications and suitability for uses intended.

- f. In accordance with the Contract, all materials, parts and equipment furnished and incorporated in the WORK shall be high grade, free from defects and imperfections, of recent manufacture and unused. Workmanship shall be of the highest grade and in accordance with the best modern standard practice.

N. STANDARD PRODUCTS

1. All materials, supplied and articles furnished shall, wherever specified and otherwise wherever practicable, be the standard products of recognized, reputable manufacturers. The standard products of manufacturers other than those specified will be accepted when it is proven to the satisfaction of the ENGINEER, in accordance with the Contract, that they are equal in strength, durability, usefulness and convenience for the purpose intended. Any changes required in the details and dimensions indicated on the drawings, or the substitution of standard products other than those provided for, shall be properly made as approved by the ENGINEER and at the expense of the CONTRACTOR.

END OF SECTION

SOUTH CAROLINA ILLEGAL IMMIGRATION REFORM ACT CONTRACTOR CERTIFICATION

In accordance with the requirements of the South Carolina Illegal Immigration Reform Act, Site Concepts, Inc. ("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 the Town of Blacksburg, SC ("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.

OR

2. Employ only workers who:

- a. Possess a valid South Carolina driver's license or identification card issued by the South Carolina Department of Motor Vehicles; or
- b. are eligible to obtain a South Carolina driver's license or identification card in that they meet the requirements set forth in S.C. Code Annotated Sections 56-1-40 through 56-1-90; or
- c. possess a valid driver's license or identification card from another state where the license requirements are at least as strict as those in South Carolina, as determined by the South Carolina Department of Motor Vehicles

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 subsubcontractor. 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 00851
DRAWINGS INDEX

<u>TITLE</u>	<u>SHEET NO.</u>
COVER SHEET	1
GENERAL LEGEND, ABBREVIATIONS, & NOTES	2
FORCE MAIN PLAN	3-9
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EROSION CONTROL DETAILS	EC2-EC-3
ELECTRICAL SITE PLAN AND DETAILS	E1

SECTION 01050

FIELD ENGINEERING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide such field engineering services as are required for proper completion of the Work including, but not necessarily limited to:
 - 1. Provide all staking required to construct the facilities from base lines established by the Engineer.
 - 2. Establish proper line and levels for installation of utilities.
 - 3. Provide surveying for record drawings.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Additional requirements for field engineering also may be described in other Sections of these Specifications.
 - 3. Section 01720 – Project Record Drawings.
 - 4. Section 02221 - Trenching
 - 5. Section 02722 – Sewers: Sanitary, Gravity

1.2 QUALITY ASSURANCE

- A. Provide a competent survey party and surveying instruments for staking the work.
- B. Exercise proper precautions to verify the figures shown on the Drawings prior to laying out any part of the Work.
 - 1. The Contractor will be held responsible for any errors therein that otherwise might have been avoided.
 - 2. Promptly inform the Engineer of any error or discrepancies discovered in the Drawings or Specifications in order that proper corrections may be made.

1.3 PROCEDURES

- A. Locate and protect control points before starting work on the site.
- B. Preserve permanent reference points during progress of the Work.
- C. Do not change or relocate reference points or items of the Work without specific approval from the Engineer.
- D. Promptly advise the Engineer when a reference point is lost or destroyed, or requires relocation because of other changes in the Work.

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01060

REGULATORY REQUIREMENTS

- A. The following requirements of Regulatory Agencies having an interest in this project are hereby made a part of this Contract.
- B. The construction of the project, including the letting of contracts in connection therewith, shall conform to the applicable requirements of State, territorial and local laws and ordinances to the extent that such requirements do not conflict with Federal laws and this subchapter.
- C. South Carolina Sales Tax: All applicable South Carolina sales tax shall be to the account of the Contractor.
- D. Use of chemicals: All chemicals used during the project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, must show approval of EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with instructions.
- E. Safety and Health Regulations: The Contractor shall comply with the Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PL 91-596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL 91-54).
- F. The Contractor shall comply with Part V of the South Carolina Manual on Uniform Traffic Control Devices for Streets and Highways.
- G. Inspection by Agencies: The representatives of the South Carolina Department of Health and Environmental Control and the Corps of Engineers shall have access to the work wherever it is, in preparation or in progress, and the Contractor shall provide proper facilities for such access and inspection.
- H. Withholding for non-residents shall comply with the following:
 - 1. Attention of non-resident Contractors is invited to Code Sections 12-8-540 and 12-8-550 as amended effective July 1, 1994, Section 49, Appropriations Bill, Part II.
 - 2. If a non-resident Contractor is the successful bidder on this project, he shall be required to provide the Owner with an Affidavit (Form I-312, Nonresident Taxpayer Registration Affidavit Income Tax Withholding) affirming registration with the South Carolina Department of Revenue or the South Carolina Secretary of State's office. (See attached form).
 - 3. Forms to register for all taxes administered by the South Carolina Department of Revenue may be obtained by calling the License and Registration Section at (803) 737-4872 or writing to South Carolina Department of Revenue, Registration Unit, Columbia, South Carolina 29214-0140.
 - 4. In the absence of an Affidavit being provided, withholding in the amount of two (2) percent of the contract price will be made by the Owner.
- I. Bypassing of wastewater: No wastewater bypassing will be permitted during construction unless a schedule has been approved by the South Carolina Department of Health and Environmental Control, if required pursuant to the terms of the NPDES permit.

1. Schedule work to minimize bypassing.
2. Coordinate all work which will affect operation of the existing treatment facility with the Owner and the Engineer to assure the least interruption possible in operation of the existing facilities.
3. Make no connections to the existing facilities diverting flow to the new facility until directed by the Engineer.

END OF SECTION

Attachment



STATE OF SOUTH CAROLINA
DEPARTMENT OF REVENUE
**NONRESIDENT TAXPAYER
REGISTRATION AFFIDAVIT
INCOME TAX WITHHOLDING**

I-312
(Rev. 7/20/00)
3323

The undersigned nonresident taxpayer on oath, being first duly sworn, hereby certifies as follows:

1. Owner, Partner(s) or Corporate Name of Nonresident Taxpayer:

2. Trade Name (Doing Business As):

3. Mailing Address: _____

4. Federal Identification Number: _____

5. _____ Hiring or Contracting with:

Name: _____

Address: _____

_____ Receiving Rentals or Royalties From:

Name: _____

Address: _____

6. I hereby certify that the above named nonresident taxpayer is currently registered with (check the appropriate box):

- ☐ The South Carolina Secretary of State or
☐ The South Carolina Department of Revenue

Date of Registration: _____

7. I understand that by this registration, the above named nonresident taxpayer has agreed to be subject to the jurisdiction of the South Carolina Department of Revenue and the courts of South Carolina to determine its South Carolina tax liability, including estimated taxes, together with any related interest and penalties.

8. I understand the South Carolina Department of Revenue may revoke the withholding exemption granted under Code Sections 12-8-540 and 12-8-550 (Previously Code Section 12-9-310) at any time it determines that the above named nonresident taxpayer is not cooperating with the Department in the determination of its correct South Carolina tax liability.

The undersigned understands that any false statement contained herein could be punished by fine, imprisonment or both.

Recognizing that I am subject to the criminal penalties under Code Section 12-54-44 (B) (6) (a) (i), I declare that I have examined this affidavit and to the best of my knowledge and belief, it is true, correct and complete.

(Signature of Owner, Partner or Corporate Officer) (Seal) _____ Date

If Corporate officer state title: _____

(Name - Please Print)

INSTRUCTIONS
NONRESIDENT TAXPAYER REGISTRATION AFFIDAVIT

REQUIREMENTS TO MAKE WITHHOLDING PAYMENTS

Code Section 12-8-550 requires persons hiring or contracting with a nonresident taxpayer to withhold 2% of each payment made to the nonresident where the payments under the contract exceed \$10,000.00. However, this section does not apply to payments on purchase orders for tangible personal property when those payments are not accompanied by services to be performed in this state.

Code Section 12-8-540 requires persons making payment to a nonresident taxpayer of rentals or royalties at a rate of \$1,200.00 or more a year for the use of or for the privilege of using property in South Carolina to withhold 7% of the total of each payment made to a nonresident taxpayer who is not a corporation and 5% if the payment is made to a corporation.

PURPOSE OF AFFIDAVIT

A person is not required to withhold taxes with regard to any nonresident taxpayer who submits an affidavit certifying that it is registered with either the South Carolina Secretary of State or the South Carolina Department of Revenue.

SECTION 01061

PERMITS AND RIGHTS-OF-WAY

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: This section establishes requirements pertaining to the securement and payment for licenses, building permits, rights-of-way, etc., necessary for the construction of the project.
- B. Work not included: The Owner will obtain and provide to the Contractor, as required, copies of:
 - 1. Encroachment permits, South Carolina Department of Transportation.
 - 2. Easements obtained to cross private property.
 - 3. Corps of Engineer permits, navigable waters, etc.
 - 4. South Carolina Water Resources permits.
 - 5. South Carolina Department of Health and Environmental Control, Permit to Construct.
 - 6. Railroad Permit
- C. Related work: Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.

1.2 SUBMITTALS

- A. Submit to the Engineer satisfactory evidence that all necessary licenses, building permits, etc., have been secured prior to commencing the work.

PART 2 - PRODUCTS

No products are required for this work.

PART 3 - EXECUTION

3.1 BUSINESS LICENSE

- A. Determine licenses necessary to perform the work at project location.
- B. Obtain all necessary licenses at no additional cost to the Owner.

3.2 BUILDING PERMITS

- A. Secure and pay for all building permits required, whether of temporary or permanent nature.

3.3 RIGHTS-OF-WAY, UTILITY LINES

- A. Owner will provide necessary rights-of-way or easements for construction of utility lines, whether on privately or publicly owned property.
- B. The Contractor shall confine his activities to the construction easement.
- C. The Owner will provide no right-of-way over other property.

END OF SECTION

SECTION 01062

CONSTRUCTION ACTIVITIES WITHIN JURISDICTIONAL WETLANDS AND OTHER WATERS OF THE UNITED STATES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Perform construction activities within the limits of wetland areas which have been permitted by the US Army Corps of Engineers.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.
 - 2. Section 02110 - Clearing and Grubbing.
 - 3. Section 02220 - Excavating, Backfilling for Structures.
 - 4. Section 02221 - Trenching, Backfilling for Utilities.
 - 5. Section 02260 - Erosion and Sediment Control.
 - 6. Section 02660 - Water Distribution System

1.2 GENERAL

- A. Throughout the life of the project, exercise every precaution necessary to ensure that all construction activities and all other miscellaneous activities will be confined to the limits of the permitted area.
 - 1. Protect adjacent wetland areas not permitted for construction or other miscellaneous activities.
 - 2. Conform to all provisions of the permit as issued by the US Army Corps of Engineers.
 - 3. Conform to all provisions of the 401 Water Quality Certification as issued by the South Carolina Department of Health and Environmental Control.

PART 2 – PRODUCTS

2.1 WETLAND SEED MIXTURE

- A. Provide wetland seed mixture at designated locations as specified in the plans.

2.2 GRASSING

- A. For all other disturbed areas outside of wetlands, comply with Section 02930 – Grassing.

2.3 SILT FENCE

- A. A double row of silt fencing is required when the silt fence is within 50 feet of a wetland. Comply with Section 02260 – Erosion and Sediment Control.

2.4 EROSION CONTROL BLANKET

- A. At stream crossings, use Erosion Control Blanket S-150 from North American Green or approved equal for streambank stabilization. Comply with Section 02260 – Erosion and Sediment control.

PART 3 – EXECUTION

3.1 GENERAL

- A. Maintain the site according to the plans and specifications until substantial completion of the project.
- B. Do not encroach upon wetland areas outside of the permitted area.
- C. Do not temporarily or permanently place construction materials, vegetation, excavated material, equipment, or any other object within wetland areas outside of the permitted area.
- D. All new pipelines within permitted wetland areas are to be installed using a trench box.
- E. Provide cofferdams for pipeline installation at all stream crossings as shown on the plans.
- F. Backfill pipeline trenches with the soil that was removed during excavation of the trench.
- G. After pipeline installation and backfill, re-grade the wetland area to pre-construction contours.
- H. The Contractor is responsible for all costs and the fulfillment of any corrective actions set forth in any penalties imposed by the US Army Corps of Engineers or other regulatory agencies arising from the Contractor's non-compliance with conditions of the permit or non-permitted activities within jurisdictional wetlands and other waters of the United States.

3.2 MEASUREMENT AND PAYMENT

- A. No separate measurement or direct payment will be made for this work and all costs for same shall be included in the price bid for the work to which it pertains.

END OF SECTION

SECTION 01090

REFERENCE STANDARDS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Throughout the Project Documents, reference is made to specifications and standards issued by nationally recognized professional and/or trade organizations.
 - 1. These referenced standards are generally identified by abbreviating the name of the organization following with the specification/standard number.
 - 2. Unless specifically indicated otherwise, all references to standards refer to the latest edition available at the time of the bidding.

1.2 ABBREVIATIONS

- A. Wherever the following abbreviations are used in these Project Documents, they are to be construed the same as the respective expressions represented:

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AISC	American Institute of Steel Construction
ALS	American Lumber Standards
ANSI	American National Standards Institute, Inc.
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
AWPA	American Wood Preservers Association
AWS	American Welding Society
FSS	Federal Specifications and Standards, General Services Administration
IBC	International Building Code
NACE	National Association of Corrosion Engineers
NFPA	National Fire Protection Association
NSF	Formerly: National Sanitary Foundation
OSHA	Occupational Safety and Health Administration
SPIB	Southern Pine Inspection Bureau
SSPC	Steel Structures Painting Council

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01200

CONTRACTOR/SUBCONTRACTOR QUALIFICATIONS

PART 1 - GENERAL

The following information and completed forms may be requested by the Owner from the three lowest bidders. The request will be made within five days following the bid opening. Requested data to be received by the Owner within ten days of the request. Failure to provide the data in this section, upon request, will subject bidder to disqualification.

1.1 DESCRIPTION

- A. Information submitted will be used by the Owner to determine the competency and ability of the Contractor/Subcontractor to perform the scheduled work in a manner deemed satisfactory to the Owner. The Owner's decision shall be final.
- B. The maximum amount of any subcontracting work shall not exceed 25% of the total price. Any Subcontractor used by the General Contractor whose portion of this project exceeds 5% of the total bid price shall be required to provide the same information as the General Contractor.
- C. The Contractor/Subcontractor shall include with this section a detailed financial statement indicating the Contractor's/ Subcontractor's financial resources. The information on that statement shall be certified by a Certified Public Accountant and shall be submitted on the Associated General Contractor's of America form "Standard Questionnaires and Financial Statement for Bidders".
- D. The Contractor/Subcontractor shall certify by attaching his signature to this Section as provided that all information contained herein is complete and all statements and answers are accurate and true. Providing misinformation, incomplete information, inaccurate information, or failure to certify the information, will subject bidder to disqualification.

1.2 QUALIFICATIONS

- A. Complete the following (attach additional sheets as required):

Name: _____
Address: _____
City, State, Zip: _____
Principal: _____

- B. Number of years your firm has been in business:_____.
- C. List and describe a minimum of five previous projects of similar size and nature completed in the last ten years. (Attach additional sheets, if necessary):

1. _____

2. _____

3. _____

4. _____

5. _____

D. List Owner, contact and telephone number for each of the five projects referenced above.
(Attach additional sheets, if necessary):

1. _____

2. _____

3. _____

4. _____

5. _____

E. For the projects listed in Item C, list the original bid price, final construction costs, specified completion time, actual completion time and explanations for differences in costs and times as required. (Attach additional sheets, if necessary):

1. Original contract price: _____
 Final construction price: _____
 Specified completion time: _____
 Actual completion time: _____
 Explanation: _____

2. Original contract price: _____
 Final construction price: _____
 Specified completion time: _____
 Actual completion time: _____
 Explanation: _____

3. Original contract price: _____
Final construction price: _____
Specified completion time: _____
Actual completion time: _____
Explanation: _____

4. Original contract price: _____
Final construction price: _____
Specified completion time: _____
Actual completion time: _____
Explanation: _____

5. Original contract price: _____
Final construction price: _____
Specified completion time: _____
Actual completion time: _____
Explanation: _____

F. List the names, addresses and work of any portion of this project which will be subcontracted (more than 1% of the bid price). (Attach additional sheets, if necessary):

1. _____

2. _____

3. _____

4. _____

5. _____

G. List equipment owned that is available for this project:

H. List equipment to be purchased, leased or rented to perform this work:

I. List superintendent(s), foremen, or others in charge, who will be assigned to this project.
Provide resumes and qualifications (insert sheets as required):

J. List and describe current projects, current status of job and estimated schedule of completion.
(Attach additional sheets, if necessary):

1. _____

2. _____

3. _____

4. _____

5. _____

K. List past projects completed with Owner of project proposed in last fifteen (15) years. (Attach additional sheets, if necessary):

1. _____

2. _____

3. _____

4. _____

5. _____

L. List past projects bid on with Owner of project proposed in last fifteen (15) years. (Attach additional sheets, if necessary):

1. _____

2. _____

3. _____

4. _____

5. _____

M. List all past projects completed with Engineer in past fifteen years (use additional sheets, if necessary):

1.	Project Name:	_____
	Project Manager: (Engineer's)	_____
	Original Contract Price:	_____
	Final Construction Price:	_____
	Specified Completion Time:	_____
	Actual Completion Time:	_____
	Explanation:	_____

2.	Project Name:	_____
	Project Manager: (Engineer's)	_____
	Original Contract Price:	_____
	Final Construction Price:	_____
	Specified Completion Time:	_____
	Actual Completion Time:	_____
	Explanation:	_____

3.	Project Name:	_____
	Project Manager: (Engineer's)	_____
	Original Contract Price:	_____
	Final Construction Price:	_____
	Specified Completion Time:	_____
	Actual Completion Time:	_____
	Explanation:	_____

4.	Project Name:	_____
	Project Manager: (Engineer's)	_____
	Original Contract Price:	_____
	Final Construction Price:	_____
	Specified Completion Time:	_____
	Actual Completion Time:	_____
	Explanation:	_____

5.	Project Name:	_____
	Project Manager: (Engineer's)	_____
	Original Contract Price:	_____
	Final Construction Price:	_____
	Specified Completion Time:	_____
	Actual Completion Time:	_____
	Explanation:	_____

N. List all projects involving litigation, arbitration and/or mediation in past twenty (20) years (Attach additional sheets, if necessary):

1.	Project Name:	_____
	Owner:	_____
	Engineer:	_____
	Date:	_____
	Explanation:	_____
	Result:	_____
2.	Project Name:	_____
	Owner:	_____
	Engineer:	_____
	Date:	_____
	Explanation:	_____
	Result:	_____
3.	Project Name:	_____
	Owner:	_____
	Engineer:	_____
	Date:	_____
	Explanation:	_____
	Result:	_____
4.	Project Name:	_____
	Owner:	_____
	Engineer:	_____
	Date:	_____
	Explanation:	_____
	Result:	_____
5.	Project Name:	_____
	Owner:	_____
	Engineer:	_____
	Date:	_____
	Explanation:	_____
	Result:	_____

- O. Attach rate schedule for equipment, labor, overhead and profit.

Rate Schedule Attached:

- P. Additional information:

Note: Attach additional sheets with supplemental information if needed.

I HEREBY CERTIFY that as a duly authorized representative of _____
_____ (bidder), the information
provided is to the best of my knowledge accurate and that failure to provide accurate information will
result in disqualification of my bid.

Signature

Name
(Please Print)

Title

Date

(SEAL)

Notary Public for North Carolina
My Commission Expires: _____

END OF SECTION

SECTION 01210

PRECONSTRUCTION CONFERENCE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: To help clarify construction contract administration procedures, the Engineer will conduct a Preconstruction Conference prior to start of the Work. Provide attendance by the designated personnel.
- B. Related work: Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

- A. For those persons designated by the Contractor, his subcontractors, and suppliers to attend the Preconstruction Conference, provide required authority to commit the entities they represent to solutions agreed upon in the Conference.

1.3 SUBMITTALS

- A. To the maximum extent practicable, advise the Engineer at least 24 hours in advance of the Conference as to items to be added to the agenda.
- B. The Engineer will compile minutes of the Conference, and will furnish three copies of the minutes to the Contractor and required copies to the Owner. The Contractor may make and distribute such other copies as he wishes.

1.4 PRECONSTRUCTION CONFERENCE

- A. The Conference will be scheduled to be held within 30 working days after the Owner has determined the low bidder and may be held prior to issuance of the Notice to Proceed when required by regulatory agencies having jurisdiction. In any event, the Conference will be held prior to actual start of the work.
- B. Attendance:
 - 1. Provide attendance by authorized representatives of the Contractor and major subcontractors.
 - 2. The Engineer will advise other interested parties, including the Owner, and request their attendance.
- C. Minimum agenda: Data will be distributed and discussed on:
 - 1. Organizational arrangement of Contractor's forces and personnel and those of subcontractors, materials suppliers, and the Engineer.
 - 2. Channels and procedures for communication.
 - 3. Construction schedule, including sequence of critical work.

4. Contract Documents, including distribution of required copies of Drawings and revisions.
5. Processing of Shop Drawings and other data submitted to the Engineer for review.
6. Processing of field decisions and Change Orders.
7. Rules and regulations governing performance of the Work.
8. Procedures for security, quality control, housekeeping, and related matters.

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01220
PROJECT MEETINGS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: To enable orderly review during progress of the Project, and to provide for systematic discussion of problems, the Engineer will conduct project meetings throughout the construction period.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. The Contractor's relations with his subcontractors and materials suppliers and discussions relative thereto, are the Contractor's responsibility and normally are not part of project meetings content.

1.2 QUALITY ASSURANCE

- A. For those persons designated by the Contractor to attend and participate in project meetings, provide required authority to commit the Contractor to solutions agreed upon in the project meetings.

1.3 SUBMITTALS

- A. Agenda items: To the maximum extent practicable, advise the Engineer at least 48 hours in advance of project meetings regarding items to be added to the agenda.
- B. Minutes:
 - 1. The Engineer will compile Minutes of each project meeting, and will furnish three copies to the Contractor and required copies to Owner.
 - 2. Recipients of copies may make and distribute such other copies as they wish.

PART 2 - PRODUCTS

(No products are required in this Section)

PART 3 - EXECUTION

3.1 MEETING SCHEDULE

- A. Project meetings will be held monthly.
- B. Coordinate as necessary to establish mutually acceptable schedule for meetings.

3.2 MEETING LOCATION

- A. The Engineer will establish meeting location. To the maximum extent practicable, meetings will be held at the project site.

3.3 PROJECT MEETINGS

A. Attendance:

1. To the maximum extent practicable, assign the same person or persons to represent the Contractor at project meetings throughout progress of the Work.
2. Subcontractors, materials suppliers, and others may be invited to attend those project meetings in which their aspect of the Work is involved.

B. Minimum agenda:

1. Review, revise as necessary, and approve Minutes of previous meetings.
2. Review progress of the Work since last meeting, including status of submittals for approval.
3. Identify problems that impede planned progress.
4. Develop corrective measures and procedures to regain planned schedule.
5. Complete other current business.

C. Revisions to Minutes:

1. Unless published Minutes are challenged in writing prior to the next regularly scheduled progress meeting, they will be accepted as properly stating the activities and decisions of the meeting.
2. Persons challenging published Minutes shall reproduce and distribute copies of the challenge to all Minutes.
3. Challenge to Minutes shall be settled as priority portion of "old business" at the next regularly scheduled meeting.

END OF SECTION

SECTION 01310

CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: To assure adequate planning and execution of the Work so that the Work is completed within the number of calendar days allowed in the Contract, and to assist the Engineer in appraising the reasonableness of the proposed schedule and in evaluating progress of the Work, prepare and maintain the schedules and reports described in this Section.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Requirements for progress schedule: General Conditions.
 - 3. Construction period: Form of Agreement.
- C. Definitions: "Day", as used throughout the Contract unless otherwise stated, means calendar day.

1.2 QUALITY ASSURANCE

- A. Employ a scheduler who is thoroughly trained and experienced in compiling construction schedule data, and in preparing and issuing periodic reports as required below.
- B. Perform data preparation, analysis, charting, and updating in accordance with standards approved by the Engineer.
- C. Reliance upon the approved schedule:
 - 1. The construction schedule as approved by the Engineer will be an integral part of the Contract and will establish interim completion dates for the various activities under the Contract.
 - 2. Should any activity not be completed within 15 days after the stated scheduled date, the Owner shall have the right to require the Contractor to expedite completion of the activity by whatever means the Owner deems appropriate and necessary, without additional compensation to the Contractor.
 - 3. Should any activity be 30 days or more behind schedule, the Owner shall have the right to perform the activity or have the activity performed by whatever method the Owner deems appropriate.
 - 4. Costs incurred by the Owner and by the Engineer in connection with expediting construction activity shall be reimbursed by the Contractor.
 - 5. It is expressly understood and agreed that failure by the Owner to exercise the option either to order the Contractor to expedite an activity or to expedite the activity by other means shall not be considered to set a precedent for any other activities.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Preliminary analysis: Within 10 calendar days after the Contractor has received the Notice to Proceed, submit one reproducible copy and four prints of a preliminary construction schedule prepared in accordance with Part 3 of this Section.
- C. Construction schedule: Within 10 calendar days after the Contractor has received the Engineer's approval to revisions of a preliminary construction schedule, submit one reproducible copy and four prints of a construction schedule prepared in accordance with Part 3 of this Section.
- D. Periodic reports: On the first working day of each month following the submittal described in Paragraph 1.3.C above, submit four prints of the construction schedule updated as described in Part 3 of this Section.

PART 2 - PRODUCTS

2.1 CONSTRUCTION ANALYSIS

- A. Graphically show by bar chart the order and interdependence of all activities necessary to complete the work, and the sequence in which each activity is to be accomplished, as planned by the Contractor and his project field superintendent in coordination with all subcontractors whose work is shown on the diagram.
 - 1. Provide two line bar chart; one for planned activity, and one for actual completion.
- B. Include, but do not necessarily limit indicated activities to:
 - 1. Project mobilization.
 - 2. Submittal and approval of shop drawings and samples.
 - 3. Procurement of equipment and critical materials.
 - 4. Fabrication of special material and equipment, and its installation and testing.
 - 5. Final cleanup.
 - 6. Final inspecting and testing.
 - 7. All activities by the Engineer that affect progress, required dates for completion, or both, for all and each part of the Work.

PART 3 - EXECUTION

3.1 PRELIMINARY ANALYSIS

- A. Contents:
 - 1. Show all activities of the Contractor under this Work for the period between receipt of Notice to Proceed and submittal of construction schedule.
 - 2. Show the Contractor's general approach to remainder of the Work.
 - 3. Show cost of all activities scheduled for performance before submittal and approval of the construction schedule.

3.2 CONSTRUCTION SCHEDULE

- A. Provide a construction schedule incorporating all revisions from review of the preliminary analysis.

3.3 PERIODIC REPORTS

- A. Provide monthly updates of the approved construction schedule.
 - 1. Indicate "actual" progress for each activity on the bar chart.
 - 2. Provide written narrative summary of revisions causing delay in the program, and an explanation of corrective actions taken or proposed.

3.4 REVISIONS

- A. Make periodic revisions to the schedule to incorporate delays, early completion, etc.
- B. Make only those revisions to approved construction schedule as are approved in advance by the Engineer.

END OF SECTION

SECTION 01340

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Make submittals required by the Contract Documents and revise and resubmit as necessary to establish compliance with the specified requirements.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.
 - 2. Individual requirements for submittals also may be described in pertinent sections of these specifications.
- C. Work not included:
 - 1. Unrequired submittals will not be reviewed by the Engineer.
 - 2. The Contractor may require his subcontractors to provide drawings, setting diagrams, and similar information to help coordinate the work, but such data shall remain between the Contractor and his subcontractors and will not be reviewed by the Engineer.

1.2 QUALITY ASSURANCE

- A. Coordination of submittals:
 - 1. Prior to each submittal, carefully review and coordinate all aspects of each item being submitted.
 - 2. Verify that each item and the submittal for it conform in all respects with the specified requirements.
 - 3. By affixing the Contractor's signature to each submittal, certify that this coordination has been performed.
 - 4. Review and coordinate each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.
- B. Completeness of submittal:
 - 1. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes.
 - 2. Determine and verify all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

- C. "Or equal":
 - 1. Where the phrase "or equal" occurs in the Contract Documents, do not assume that the materials, equipment or methods will be considered as equal unless the item has been specifically so approved for this Work by the Engineer.
 - 2. The decision of the Engineer shall be final.
- D. The Engineer shall assume that no shop drawing or related submittal comprises a variation unless the Contractor advises the Engineer otherwise in writing.

1.3 SUBMITTALS

- A. Within 15 calendar days after the Contractor has received the Owner's notice to proceed, submit:
 - 1. Schedule for submittals including specification section, type of submittal and submittal date.
 - 2. Construction schedule.
 - 3. Schedule of partial payment requests.
- B. Make submittals of shop drawings, samples, substitution requests and other items in accordance with the provisions of this Section.

PART 2 - PRODUCTS

2.1 SHOP DRAWINGS

- A. Scale and measurements: Make shop drawings accurately to a scale sufficiently large to show all pertinent aspects of the item and its method of connection to the Work.
- B. Large prints (11" x 17" or larger):
 - 1. Submit shop drawings in the form of white copies.
 - 2. Blueprints will not be acceptable.
- C. Manufacturer's literature:
 - 1. Where contents of submitted literature from manufacturers includes data not pertinent to the submittal, clearly show which portions of the contents are being submitted for review.
 - 2. Submit the number of copies which are required to be returned, plus four copies of electrical and three copies of all other submittals which will be retained by the Engineer.
- D. Number of copies:
 - 1. Submit the number of copies which are required to be returned, plus three copies which will be retained by the Engineer.
 - 2. Electrical shop drawings: submit the number of copies which are required to be returned, plus four copies which will be retained by the Engineer.

- E. Do not begin fabrication of equipment or materials prior to Engineer's approval of shop drawings.

2.2 VARIATIONS

- A. With each submittal, provide specific written notice of any variations, that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.
- B. Provide an explanation of why the item(s) submitted are considered to be equal to the item(s) specified.
- C. Failure to submit a written notice will result in rejection of the submittal.

2.3 SAMPLES

- A. Provide sample or samples identical to the precise article proposed to be provided. Identify as described under "Identification of submittals" below.
- B. Number of samples required:
 - 1. Unless otherwise specified, submit samples in the quantity which is required to be returned, plus one which will be retained by the Engineer.
 - 2. By prearrangement in specific cases, a single sample may be submitted for review and, when approved, be installed in the work at a location agreed upon by the Engineer.

2.4 COLORS AND PATTERNS

- A. Unless the precise color and pattern is specifically called out in the Contract Documents, and whenever a choice of color or pattern is available in the specified products, submit accurate color and pattern charts to the Engineer for selection.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW OF SUBMITTALS

- A. Before submitting a shop drawing or any related material, Contractor shall:
 - 1. Determine and verify all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto.
 - 2. Determine and verify the suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work
 - 3. Review each such submission for conformance with the means, methods, techniques, sequences, and operations of construction, and safety precautions and programs incidental thereto, all of which are the sole responsibility of Contractor.
 - 4. Approve each such submission before submitting it.

5. Stamp and sign each such submission before submitting it.
- B. Shop drawings and related materials shall be returned with comments provided that each submission has been specified and is stamped by the Contractor.
- C. Shop drawings or material not specified or which have not been approved by the Contractor shall be returned without comment.
- D. Contractor is to utilize the following stamp on all shop drawing submittals:

This shop drawing has been reviewed by [NAME OF CONTRACTOR] and approved with respect to the means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incidental thereto. [NAME OF CONTRACTOR] also warrants that this shop drawing complies with contract documents and comprises no variations thereto.	
By:	_____
Date:	_____

- E. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of the General Conditions and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of the General Conditions.

3.2 IDENTIFICATION OF SUBMITTALS

- A. Consecutively number all submittals.
1. When material is resubmitted for any reason, transmit under a new letter of transmittal and with a new transmittal number.
 2. On resubmittals, cite the original submittal number for reference.
- B. Accompany each submittal with a letter of transmittal showing all information required for identification and checking.
- C. On at least the first page of each submittal, and elsewhere as required for positive identification, show the submittal number in which the item was included.
- D. Maintain an accurate submittal log for the duration of the work, showing current status of all submittals at all times. Make the submittal log available to the Engineer for his review upon request.

3.3 GROUPING OF SUBMITTALS

- A. Unless otherwise specified, make submittals in groups containing all associated items to assure that information is available for checking each item when it is received.
1. Partial submittals may be rejected as not complying with the provisions of the Contract.

2. The Contractor may be held liable for delays so occasioned.

3.4 TIMING OF SUBMITTALS

- A. Make submittals far enough in advance of scheduled dates for installation to provide time required for reviews, for securing necessary approvals, for possible revisions and resubmittals, and for placing orders and securing delivery.
- B. In scheduling, allow at least twenty-five working days for review by the Engineer following his receipt of the submittal.

3.5 RESUBMITTAL SCHEDULE

- A. For submittals marked "Furnish as Corrected" by the Engineer, resubmittal shall be within ninety (90) days of the review date shown on the Engineer's shop drawing review stamp.
- B. For submittals marked "Revise and Resubmit", "Submit Specified Item", or "Rejected", resubmittal shall be within thirty (30) days of the review date shown on the Engineer's shop drawing review stamp.

3.6 ENGINEER'S REVIEW

- A. Review by the Engineer does not relieve the Contractor from responsibility for errors which may exist in the submitted data.
- B. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer.
- C. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
- D. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto.
- E. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
- F. Revisions:
 1. Make revisions required by the Engineer.
 2. If the Contractor considers any required revision to be a change, he shall so notify the Engineer as provided for in the General Conditions.
 3. Make only those revisions directed or approved by the Engineer.
 4. Submittals which have been reviewed and returned to the Contractor marked "Revise and Resubmit" or "Rejected" and which are resubmitted and not in an approvable state, will not be reviewed a third time unless payment for the third and any subsequent review is by the Contractor. The engineering costs for review shall

be equal to the Engineer's charges to the Owner under the terms of the Engineering Agreement with the Owner.

END OF SECTION

SECTION 01400

MEASUREMENT AND PAYMENT

GENERAL

This section shall be the basis for payment for all work proposed under this project and shall include all labor, materials, tools, equipment, transportation, overhead, profit, insurance, taxes and all other costs necessary to provide for a complete and proper installation and placement in service of the work. No additional compensation will be considered, except for work approved by the Owner as a change to the work as a bid.

01. CONTRACTOR MOBILIZATION:

Mobilization shall be paid for at the lump sum amount established in the bid and shall include all costs associated with the cost of insurance; payment and performance bonds; the contractor's cost of moving personnel and equipment to the project site; contractor's facilities on site; project signs; temporary site access; and other incidentals incurred prior to beginning actual construction of the project.

Payment for the cost of mobilization shall be limited to a maximum of five (5%) percent of the total contract amount. The amount of mobilization as listed in the Bid shall not be reduced in determining the total Bid amount.

Reference: Bid Item No. 1

02. New Duplex Pump Station:

The Duplex Sewage Pump Station shall be paid for at the lump sum price established in the bid and shall include all costs, labor, materials, fees, etc. associated with providing a complete and working sewage pump station. At a minimum, the lump sum price shall include the following:

- Confirmation of existing site conditions
- Unclassified excavation and properly compacted backfill
- Removal and disposal of unsuitable material
- Providing and installing select backfill material
- Dewatering of excavation
- Providing and installing necessary piping, fittings, valves, couplings, etc.
- 12 " depth of stone bedding
- Installation of new precast concrete wet well and valve vault, frames, hatches, etc.
- Pumps, motors, wiring, electrical, gauges, hardware
- Electrical service, controls, starters, level devices, alarms
- Construction of 8" thick reinforced concrete slabs
- Pipe restraints, restrained joints, fittings, thrust blocking, etc.
- Removal and proper disposal of construction debris
- Site restoration, removal of excess material
- Compaction testing, concrete testing, leakage testing
- Painting, Misc. Metals
- Start-up, testing, operation
- Drainage piping, gravel, fabric

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- Other work as required for a complete and proper installation

Reference: Bid Item No. 2

03. Pump Station Site Work:

The Pump Station Site Work shall be paid for at the lump sum price established in the bid and shall include all costs, labor, materials, fees, etc. associated with providing a complete and operational Pump Station Site. At a minimum, the lump sum price shall include the following:

- Confirmation of existing site conditions
- Site clearing, grubbing, and grading
- Unclassified excavation and properly compacted backfill
- Removal and disposal of unsuitable material
- Providing and installing select backfill material
- Dewatering of excavation
- Providing and installing necessary piping, fittings, valves, couplings, etc.
- 8" depth of surface stone inside fence
- Lighting, site electrical
- Removal and proper disposal of construction debris
- Site restoration, removal of excess material
- Compaction testing, concrete testing, leakage testing
- Painting, Misc. Metals
- Fencing
- Entrance drive, gravel, fabric
- Other work as required for a complete and proper installation

Reference: Bid Item No. 3

04. GRAVITY SEWER – PVC, OPEN CUT:

Work performed under this bid item shall be paid for at the unit price per linear foot established in the bid for the various line sizes and depths and shall include all costs associated with installing the PVC gravity sewer line by the open cut trench method. The depths shall be measured from the invert of the pipe to the existing ground surface. The unit price shall include, at a minimum, the following items:

- All field engineering and survey staking
- Field investigation work as outlined on the Contract Drawings and in the Specifications
- Clearing and grubbing operations
- Removal and proper disposal of clearing and construction debris
- By-pass pumping, if required to complete the connection
- Daily clean-up of the construction site
- Unclassified excavation and properly compacted backfill
- Removal and disposal of unsuitable materials
- Providing and installing select backfill material
- Required bedding
- Polyvinyl Chloride (PVC) Pipe SDR 35
- Pipe installation and jointing of pipe
- Dewatering of trench excavation

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- Surface restoration of disturbed areas of construction
- Removal and replacement of existing fences
- Crossing of existing streams, ditches, wetland areas, etc.
- Temporary structures or other work to assist in the installation of the gravity sewer
- Preparation and submittal of cut sheets
- Other work as required for a complete and proper installation and compliance with the Contract Documents

Measurement of the gravity sewer shall be over the centerline of the pipe and shall be measured from end to end of the pipe for the various pipe sizes and depths installed.

Reference: Bid Item No. 4

05. MANHOLES:

Manholes shall be paid for at the unit price established in the bid for the manhole diameter(s) listed and a depth of 10 ft., measured from the invert of the lowest pipe, and as shown on the contract drawings and specifications. The unit price shall include at a minimum the following items:

- All site work
- Unclassified excavation
- By-pass pumping, if required to complete the connection
- 12" thick stone bedding for manhole
- Pre-cast concrete manhole
- Manhole frame and covers
- Pre-cast grade rings
- Joint collars
- Inverts
- Grouting
- Manhole steps
- Flexible pipe boots
- Castings
- Pipe installation
- Properly compacted backfill
- Surface restoration
- Clean-up
- All other costs associated with a complete and proper installation.
- Includes dog house manholes over existing sewers.

Additional depth of manholes shall be paid for at the unit price per vertical foot established in the bid for the various diameter(s) of manholes and shall be measured from a point six feet above the invert of the lowest pipe to the top of the frame, and shall include all work and costs as shown in the above paragraph.

Reference: Bid Item No. 5

06. CONNECTIONS TO EXISTING SEWER:

Connections to the existing sewer system shall be paid for at the unit price established in the bid and shall include all costs of connecting to the existing system which are not paid for under other bid items. At a minimum, the unit price shall include the following:

- Confirmation of existing site conditions
- Unclassified excavation and properly compacted backfill
- Removal and disposal of unsuitable material
- Providing and installing select backfill material
- Dewatering of excavation
- By-pass pumping, if required to complete the connection
- Providing and installing necessary couplings
- Plugging, cutting, etc.
- 12 " depth of stone bedding
- Construction of invert channels in the manholes and grouting
- Removal and proper disposal of construction debris
- Site restoration
- Other work as required for a complete and proper installation

Reference: Bid Item No. 6

07. 6-inch Sewer Force Main:

Work performed under this bid item shall be paid for at the unit price per linear foot established in the bid for the 6-inch Sewer Force Main in the material bid and shall include all costs associated with installing the force main by the open cut trench method. The unit price shall include, at a minimum, the following items:

- All field engineering and survey work
- Field investigation work as outlined on the Contract Drawings and in the Specifications
- Clearing and grubbing operations
- Removal and proper disposal of clearing and construction debris
- Daily clean-up of the construction site
- Unclassified excavation and properly compacted backfill
- By-pass pumping or pump and haul, if required to complete the connection
- Removal and disposal of unsuitable materials
- Providing and installing select backfill material
- Class "B" -Type 2" bedding
- PVC C-900 Pipe or Restrained Joint Ductile Iron Pipe, Protecto 401 lined.
- Pipe installation and jointing of pipe
- Pipe restraints, restrained joints, fittings, thrust blocking, etc.
- Dewatering of trench excavation
- Surface restoration of disturbed areas of construction
- Removal and replacement of existing fences
- Crossing of existing streams, ditches, wetland areas, etc.
- Temporary structures or other work to assist in the installation of the force main
- Preparation and submittal of cut sheets.
- Pressure Testing of Force Main

- Other work as required for a complete and proper installation and compliance with the Contract Documents

Measurement of the 6-inch Sewer Force Main shall be over the centerline of the pipe and shall be measured from end to end of the pipe installed, horizontal distance.

Reference: Bid Item No. 7

8. EROSION CONTROL FACILITIES:

a. Temporary Construction Entrances: Temporary construction entrances shall be paid for at the unit price established in the bid for each temporary entrance and shall include all costs associated with installing, maintaining, and removal of all temporary construction entrances in accordance with the contract specifications and drawings or as directed by the Engineer. Payment for the temporary construction entrances will be based on the following:

- At initial installation – 50% of the total work claimed
- After satisfactory removal of the temporary installation – Remaining 50% of the total work claimed

b. Sediment Tube Check Dam: Sediment tube check dam shall be paid for at the unit price per each check dam as established in the bid and shall include all costs associated with providing, installing, maintaining, and removal of the sediment tube type check dam in accordance with the contract specifications and drawings or as directed by the Engineer. Payment for the sediment tube type check dam shall be based on the following:

- At initial installation – 50% of the total work claimed
- After satisfactory removal of the check dam installation – Remaining 50% of the total work claimed

c. Sediment Tube Inlet Protection: Sediment tube inlet protection shall be paid for at the unit price per each inlet protection as established in the bid and shall include all costs associated with providing, installing, maintaining, and removal of the sediment tube type check dam in accordance with the contract specifications and drawings or as directed by the Engineer. Payment for the sediment tube inlet protection shall be based on the following:

- At initial installation – 50% of the total work claimed
- After satisfactory removal of the sediment tube inlet protection installation – Remaining 50% of the total work claimed

d. Silt Fencing: Silt fencing shall be paid for at the unit price per linear foot established in the bid and shall include all costs associated with providing, installing, maintaining, and removal of the silt fence in accordance with the contract drawings and specifications or as directed by the Engineer. Payment for the silt fencing shall be based on the following:

- At initial installation – 50% of the total work claimed
- After satisfactory removal of the silt fence – Remaining 50% of the total work claimed

e. Supplemental Gravel: Supplemental gravel shall be paid for at the unit cost per ton established in the bid and shall include all costs of installing, maintaining, and removal of gravel, if required, in accordance with the contract drawings and specifications or as directed by the Engineer. Payment for gravel will require that original copies of all shipping receipts be furnished with the

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payment request. The shipping receipt/delivery ticket shall indicate delivery to the Blacksburg job site. No gravel will be paid for without such notation. Full unit price payment will be made for all supplemental gravel when installed. Supplemental Gravel does not include gravel required for bedding of pipe, manholes, manhole abandonment/removal, paving repairs, or unsuitable soils.

f. Supplemental Rip-Rap: Supplemental rip-rap shall be paid for at the unit cost per ton established in the bid and shall include all costs of installing, maintaining, and removal of rip-rap, if required, in accordance with the contract drawings and specifications or as directed by the Engineer. Payment for rip-rap will require that original copies of all shipping receipts be furnished with the payment request. The shipping receipt/delivery ticket shall indicate delivery to the Blacksburg job site. No rip-rap will be paid for without such notation. Full unit price payment will be made for all supplemental rip-rap when installed.

g. Grassing: Permanent grassing shall be paid for at the lump sum amount established in the bid and shall include all costs associated with providing permanent grassing in full compliance with the Contract Documents. At a minimum, permanent grassing shall include the following:

- Fine grading and disking of disturbed areas to ensure that the areas have been restored to original grades and /or improved to provide adequate drainage
- Pulverizing of all disturbed areas
- Fertilizing of all areas to receive permanent grassing
- Inventory of existing lawns which have been disturbed to ensure that permanent grassing installed will be the same as existing grass found in the private lawns.
- Grass seed of the appropriate types and mixtures
- Sowing of seed
- Strawing / mulching of all grassed areas
- Regrassing of areas where permanent grassing was not achieved
- Prior to demobilization and before release of final payment, the mowing of all grassed areas along the water mains installed.

The percent completion of permanent grassing shall be determined by the Engineer and the Contractor. Payment for permanent grassing will not be made until the areas grassed have achieved a height of at least 2 inches and is uniform in density.

Unit prices for erosion control facilities shall also include all costs associated with providing the required stormwater / erosion control monitoring and reporting services as mandated by the approved SWPPP for the project.

Reference: Bid Item No. 8

9. PAVEMENT REPLACEMENT:

Full Depth Pavement Patch: Work under this bid item shall be paid for at the unit price per linear foot established in the bid and shall include all costs associated with replacing existing roadway with a full depth pavement patch and full width asphalt overlay in full compliance with the Contract Documents. At a minimum, the unit price shall include the cost of:

- Meet compaction requirements
- Re-establishment of stone base
- Required paving rings for MH frames and valve boxes
- Full Depth Pavement Patch in accordance with SCDOT specifications
- Repainting of roadway lines as required by SCDOT or County

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- Other work as required for a complete and proper installation and satisfaction of SCDOT or County

Asphalt Overlay: Work under this bid item shall be paid for at the unit price per square yard established in the bid and shall include all costs associated with replacing existing roadway with a full width asphalt overlay in full compliance with the Contract Documents. At a minimum, the unit price shall include the cost of:

- Meet compaction requirements
- Re-establishment of stone base
- Required paving rings for MH frames and valve boxes
- Resurface entire roadway to ten feet past the limits of disturbance longitudinally in accordance with SCDOT specifications
- Repainting of roadway lines as required by SCDOT or County
- Other work as required for a complete and proper installation and satisfaction of SCDOT or County

Measurement of pavement areas shall be performed by the Engineer and the Contractor.

Reference: Bid Item No. 9

10. TESTING:

All testing shall be paid for at the lump sum price established in the bid and shall include all costs associated with on-site testing during and after backfill operations and the preparation and submission of the testing laboratory's certification of testing along the sewer line route.

All compaction testing shall be included in the lump sum price established in the bid and shall include all costs associated with on-site compaction testing during and after backfill operations and the preparation and submission of the testing laboratory's certification of testing along the sewer line route. Copies of the field compaction reports and testing firm's certification must be submitted with each pay estimate. Only compaction tests authorized or requested by the Engineer and show compliance with the Contract Documents will be paid for. Costs of compaction tests indicating non-compliance with the Contract Documents must be borne by the Contractor.

Mandrel/deflection testing shall be included in the lump sum amount and shall include all gravity sewer line installed and shall include all costs associated with performing this test as per the requirements of the contract specifications. Deflection/mandrel testing shall be limited to main line sewers installed (8" or larger) and shall be paid only for lines deemed in compliance with the contract documents.

Air/infiltration testing shall be included in the lump sum amount and shall include all gravity sewer line installed (including 4" service lines) and shall include all costs associated with the performance of the test in compliance with the requirements of the contract specifications. Payment for such testing shall be limited to those lines deemed in compliance with the contractor documents.

Manhole vacuum tests shall be included in the lump sum amount and shall include all costs associated with performance of the test. Payment for such testing shall be limited to those manholes deemed in compliance with the requirements of the contract specifications.

Force Main Pressure testing shall be included in the lump sum amount and shall include all pressure force mains installed and shall include all costs associated with the performance of the test in

compliance with the requirements of the contract specifications. Payment for such testing shall be limited to those lines deemed in compliance with the contractor documents.

Reference: Bid Item No. 10

11. CLASSIFIED EXCAVATION:

Work under this bid item shall be paid for at the unit price per cubic yard of rock removed as established in the bid and shall be measured on the basis of a specified trench width of three (3) feet and the depth of solid rock to a point of six (6) inches below grade. The unit price shall include at a minimum pre and post surveys of existing near-by structures, proper permitting and licensing, drilling, blasting, excavation and proper disposal of rock, select backfill, and proper bedding materials. No classified excavation will be paid for without prior approval of the Owner, Engineer or their representatives in the field prior to beginning of excavation.

Classified excavation required beyond the specified trench width of three feet shall be included in the unit cost of the gravity sewer line.

Reference: Bid Item No. 11

12. CONTRACTOR DEMOBILIZATION:

Demobilization shall be paid for at the lump sum amount established in the bid and shall include all costs associated with the final punch list/cleanup items; temporary site access restoration; removal of construction equipment from the project site; contractor administrative work associated with project closeout documentation; and other items required to completely demobilize from the project site. Demobilization costs established in the bid shall not be less than one (1) percent of the total bid amount.

Reference: Bid Item No. 12

END OF SECTION

SECTION 01410

TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included:

1. Cooperate with the Owner's selected testing agency and all others responsible for testing and inspecting the work.
2. Provide such other testing and inspecting as are specified to be furnished by the Contractor in this Section and/or elsewhere in the Contract Documents.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.
2. Requirements for testing may be described in various Sections of these specifications.
3. Where no testing requirements are described, but the Owner decides that testing is required, the Owner may require such testing to be performed under current pertinent standards for testing. Payment for such testing will be made as described in this Section.

C. Work not included:

1. Selection of testing laboratory: The Owner will approve a qualified independent testing laboratory.
2. Payment for initial testing: The Contractor will pay for all initial services of the testing laboratory as further described in Article 2.1 of this Section.
3. Tests at point of manufacture as specified in other Sections of these documents are to be made with all costs borne by the Contractor.

1.2 QUALITY ASSURANCE

- A. The testing laboratory will be qualified to the Owner's approval in accordance with ASTM E 329.
- B. Testing, when required, will be in accordance with all pertinent codes and regulations and with selected standards of the American Society for Testing and Materials.

1.3 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01640.
- B. Promptly process and distribute required copies of test reports and related instructions to assure necessary retesting and replacement of materials with the least possible delay in progress of the work.

PART 2 - PRODUCTS

2.1 PAYMENT FOR TESTING

A. Initial services:

1. The Contractor shall be responsible for all testing of the waterlines. Soil compaction density testing and concrete cylinder testing shall be paid for by the Contractor. See the appropriate specification sections for details.
2. Retesting: When initial tests indicate non-compliance with the Contract Documents, subsequent re-testing occasioned by the non-compliance shall be performed by the same testing agency and all costs will be borne by the Contractor.

2.2 CODE COMPLIANCE TESTING

- #### A.
- Inspections and tests required by codes or ordinances, or by a plan approval authority, and which are made by a legally constituted authority, shall be the responsibility of and shall be paid for by the Contractor, unless otherwise provided in the Contract Documents.

2.3 CONTRACTOR'S CONVENIENCE TESTING

- #### A.
- Inspecting and testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.

PART 3 - EXECUTION

3.1 COOPERATION WITH TESTING LABORATORY

- #### A.
- Representatives of the testing laboratory shall have access to the work at all times and at all locations where the work is in progress. Provide facilities for such access to enable the laboratory to perform its functions properly.

3.2 TAKING SPECIMENS

- #### A.
- All specimens and samples for testing, and deliveries to laboratory, unless otherwise provided in the Contract Documents, shall be taken by the testing personnel. All sampling equipment and personnel will be provided by the testing laboratory. All deliveries of specimens and samples to the testing laboratory will be performed by the testing laboratory.

3.3 SCHEDULES FOR TESTING

A. Establishing schedule:

1. By advance discussion with the testing laboratory selected by the Owner, determine the time required for the laboratory to perform its tests and to issue each of its findings.
2. Provide all required time within the construction schedule.

- #### B.
- Revising schedule: When changes of construction schedule are necessary during construction, coordinate all such changes with the testing laboratory as required.

END OF SECTION

SECTION 01640

PRODUCT HANDLING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Protect products scheduled for use in the work by means including, but not necessarily limited to, those described in this Section.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.
 - 2. Additional procedures also may be prescribed in other Sections of these specifications.

1.2 QUALITY ASSURANCE

- A. Include within the Contractor's quality assurance program such procedures as are required to assure full protection of work and materials.

1.3 MANUFACTURERS' RECOMMENDATIONS

- A. Except as otherwise approved by the Engineer, determine and comply with manufacturer's recommendations on product handling, storage and protection.

1.4 PACKAGING

- A. Deliver products to the job site in their manufacturer's original container, with labels intact and legible.
 - 1. Maintain packaged materials with seals unbroken and labels intact until time of use.
 - 2. Promptly remove damaged material and unsuitable items from the job site and promptly replace with material meeting the specified requirements, at no additional cost to the Owner.
- B. The Engineer may reject as non-complying such material and products that do not bear identification satisfactory to the Engineer as to manufacturer, grade, quality and other pertinent information.

1.5 PROTECTION OF MATERIAL AND WORK

- A. General:
 - 1. Carefully and properly protect all materials of every description, both before and after being used in the Work in accordance with manufacturer's recommendations.
 - 2. Provide any enclosing or special protection from weather deemed necessary by the Engineer at no additional cost to the Owner.

- B. Partial payments under the Contract will not relieve the Contractor from responsibility.
 - 1. When materials and work at the site that have been partially paid for are not adequately protected by the Contractor, such materials will be protected by the Owner at the expense of the Contractor and no further partial payment thereon will be made.
- C. Maintain finished surfaces clean, unmarred, and suitably protected until accepted by the Owner.

1.6 STORAGE

- A. Store all items of equipment, component parts, etc., in accordance with the manufacturers' recommendations or as may otherwise be necessary to prevent damage or deterioration of any sort.
- B. Electrical and control equipment:
 - 1. Store in a dry area protected from dust and humidity.
 - 2. Equipment can be protected by a weatherproof cover if shipped to the site no more than two (2) weeks prior to installation and energization.

1.7 REPAIRS AND REPLACEMENTS

- A. In the event of damage, promptly make replacements and repairs to the approval of the Engineer and at no additional cost to the Owner.
- B. Additional time required to secure replacements and to make repairs will not be considered by the Engineer to justify an extension in the contract time of completion.

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01650

GENERAL EQUIPMENT REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Requirements relating to providing of equipment and services specified in other Sections of these specifications.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections of Division 1 of these Specifications.
 - 2. Additional provisions concerning this work may be stated in other sections of these specifications.
 - 3. Where new equipment is to be installed into existing structures or systems, verify the plan dimensions with existing dimensions and note any discrepancies on the shop drawings.
- C. Allotted space and modifications:
 - 1. Equipment furnished under this Section shall be installed at the location and in the space allotted on the Contract Drawings.
 - 2. Any structural, piping, wiring, drawings, or other modifications required to accommodate equipment offered other than that shown on the Drawings, or specified, shall be done at no additional cost to the Owner.

1.2 QUALITY ASSURANCE

- A. Equipment manufacturers shall, upon request of the Engineer, provide a detailed list of installations of comparable function.
- B. Equipment in each Section shall be by a single manufacturer regularly engaged in the development of equipment designed for the intended function.
- C. Guarantee the availability of repair parts and service for a period of not less than fifteen (15) years.
 - 1. Provide each component with a serial number and the manufacturer shall maintain records of same.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Supply all materials, tools, equipment, labor and supervision to properly complete installation of equipment, piping, controls, etc., in compliance with the contract documents.

2.2 IDENTIFICATION

- A. Provide stamped identification labels on motors and equipment with pertinent information including serial numbers, model numbers, capacities, voltage, amps, etc.
- B. Label to be aluminum or stainless steel.
- C. Attach with stainless steel or aluminum hardware.

2.3 LUBRICANTS AND LUBRICATING EQUIPMENT

- A. Provide and install necessary oils, greases, etc., for initial operation of equipment.
- B. Where manufacturer's recommendations include changing of initial lubricants after 1,000 hours or less of operation, provide sufficient lubricants to make the change.
- C. Provide one of every type lubricating gun required to properly maintain the equipment.

2.4 OPERATION, MAINTENANCE AND SERVICE MANUALS

- A. Prepare and submit for the Owner's use an O&M Manual for each piece of equipment.
 - 1. Within 30 days of receipt of the Owner's Notice to Proceed, submit an initial listing of O&M manuals to be submitted. Secure the Engineer's approval of the overall listing. Note the minimum listing of manuals required in item L below.
 - 2. Submit two (2) preliminary copies of each manual for comment and approval within 30 days after shop drawing approval.
 - 3. Submit six (6) hard copies and two (2) electronic copies in CD ROM / DVD format of each approved manual prior to delivery of equipment.
- B. Manuals shall be specific to the equipment supplied.
 - 1. Manuals applicable to many different configurations and which require the operator to selectively read portions of the instructions will not be accepted.
 - 2. The equipment model that the Manual applies to shall be indicated by an arrow.
- C. Provide a Table of Contents specific to each Manual.
- D. At the beginning of each Manual, provide a description of the equipment to include model numbers, purchase order numbers, serial numbers, motor information, and performance and design criteria.

- E. Correlate Manuals with the approved shop drawings and include the following minimum information:
1. Parts list, including recommended spare parts list.
 2. Guaranties.
 3. Recommended maintenance instructions.
 4. Recommended lubricants and lubrication instructions.
 5. Address and telephone number of the source for repairs, spare parts and service.
 6. Detailed description of operating procedure for the item of equipment specifically written for this installation, including start-up and shutdown procedures.
 7. Equipment performance specifications, including pump curves.
 8. Results of start-up and any further recommendations resulting from start-up.
 9. Current cost for each recommended spare part and agreement to provide updated costs at Owner's request.
- F. Provide a maintenance and lubrication schedule to be a summary of all preventative maintenance and lubrication, including the following information:
1. Title.
 2. Type of activity (inspection, adjustment, oil change, etc.).
 3. Brief description of activity.
 4. Type of lubricant.
 5. Frequency (daily, weekly, etc.).
- G. The manufacturer shall provide the Owner with a log chart to record all servicing and maintenance required during the equipment warranty period.
- H. For process oriented equipment, treatment plants, etc., provide a detailed description of the process operation and trouble-shooting of problems.
- I. Provide clear and legible copies. Type parts lists, etc.
- J. Layout and detail drawings shall be reduced to a maximum size of 11" x 17", unless written approval is received from the Engineer prior to submittal of Manuals.
- K. Provide a clearly labeled three-ring binder for Manuals having a thickness greater than 1/4". Provide sheet lifters if binder is more than 2/3 full.
1. Provide multiple binders for Manuals having a thickness greater than 2".
- L. At a minimum, O&M Manuals shall be provided for the following:
1. Pressure Reducing Valves
- M. All O&M Manuals are to include as-built drawings and/or schematics, installation manuals, installation, start-up and inspections reports by the equipment manufacturer or certified technician / representative, certified equipment performance curves or data, trouble shooting information, routine maintenance requirements, spare parts listing with current pricing, etc.

- N. Information which is not relevant to the installation shall not be included in the O&M Manuals.

PART 3 - EXECUTION

3.1 GENERAL

- A. Provide information that may be requested without undue delay.
- B. Deliver O&M Manuals to the Engineer for review and approval and transmittal to the Owner.
 - 1. Do not start equipment unless the Owner has approved O&M Manuals.
- C. Properly lubricate all equipment prior to start-up.
- D. Work under sections requiring submittal of O&M Manual will not be considered complete and final payment will not be made until all Manuals have been submitted and approved.
- E. Provide revisions to O&M Manuals to reflect any changes made during installation and start-up of equipment.

3.2 WARRANTY PERIOD

- A. Equipment warranties shall commence upon successful completion of the thirty (30) day operational period after project acceptance by Owner and shall be for a minimum period of one (1) year.
- B. Contractor will be notified in writing of beginning and ending dates of warranty period.

END OF SECTION

SECTION 01700
CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included shall be providing compliance with the requirements of the General Conditions of these Specifications for administrative procedures in closing out the project work.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Other requirements for technical services are stated in other sections of these Specifications.
 - 3. Section 00690 - Contractor's Affidavit.
 - 4. Section 01720 - Project Record Documents.

1.2 SUBSTANTIAL COMPLETION

- A. The Contractor shall notify the Engineer that, in his opinion, the project is substantially complete. A written statement listing items complete shall be submitted.
- B. Upon receipt of the Contractor's notice, the Engineer shall make an observation to determine if substantial completion is provided.
- C. If, in the Engineer's opinion, the project is not substantially complete, a written notice to the Contractor shall follow outlining reasons and deficiencies in work that comprised the Engineer's decision. The Engineer's decision shall be final.

1.3 FINAL OBSERVATION

- A. The Engineer will make a final observation for the Contractor after all items noted in the substantial completion observation have been corrected. The Contractor shall notify the Engineer in writing when a final observation is needed. Incomplete and/or defective work shall be given to the Contractor by written notice.

1.4 RE-OBSERVATION

- A. Re-observation required due to failure by the Contractor to make previously noted corrections will be performed by the Engineer.
- B. Cost for such observations will be due to and payable by the Contractor at a rate equal to charges to the Owner for similar work.
- C. Re-observations will continue until the work is acceptable to the Engineer.

1.5 COMPLETION BY CONTRACTOR

- A. When the Engineer finds the Contractor's work acceptable, the Contractor shall be given such notice and should proceed with closeout submittals.
- B. Closeout submittals shall contain at least the following:
 - 1. Project record documents.
 - 2. Equipment operation and maintenance manuals and copies of start-up reports.
 - 3. Warranties and bonds.
 - 4. Spare parts and manuals.
 - 5. Evidence of payment and release to liens per General Conditions.
 - 6. Section 00690 - Contractor's Affidavit.
 - 7. Letters of approval from each property owner confirming satisfaction of final cleanup of easement.

1.6 FINAL PAYMENT

- A. Final payment to the Contractor will be made upon completion of the previous items and others required by these specifications. A final statement shall be forwarded to the Engineer. The statement shall address:
 - 1. Previous change orders.
 - 2. Unit prices.
 - 3. Deductions for uncorrected work.
 - 4. Deductions for liquidated damages.
 - 5. Deductions for re-testing work.
 - 6. Deductions for re-observation.
 - 7. Deductions for shop drawing review.
 - 8. Adjusted contract sum.
 - 9. Previous payments.
 - 10. Amount due.
- B. When required, the Engineer will prepare a contract change order for adjustments not previously made.

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included:

1. Throughout progress of the Work, maintain an accurate record of changes in the Contract Documents, as described in Article 3.1 below.
2. Upon completion of the Work, deliver the recorded changes to the Engineer.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.
2. Other requirements affecting Project Record Documents may appear in pertinent other Sections of these specifications.

1.2 QUALITY ASSURANCE

- A. Delegate the responsibility for maintenance of Record Documents to one person on the Contractor's staff as approved by the Engineer.
- B. Accuracy of records shall be such that future search for items shown on the Project Record Documents may rely reasonably on the information provided under this Section of the Work.

1.3 SUBMITTALS

- A. The Engineer's approval of the current status of Project Record Documents may be a prerequisite to the Engineer's approval of requests for progress payment and request for final payment under the Contract.
- B. Prior to submitting each request for progress payment, secure the Engineer's approval of the current status of the Project Record Documents.
- C. Prior to submitting request for final payment, submit the final Project Record Documents to the Engineer and secure his approval.

1.4 PRODUCT HANDLING

- A. Maintain the job set of Record Documents completely protected from deterioration and from loss and damage until completion of the Work and transfer to the Engineer.
- B. In the event of loss of recorded data, use means necessary to again secure the data to the Engineer's approval.
1. Such means shall include, if necessary in the opinion of the Engineer, removal and replacement of concealing materials.

2. In such case, provide replacements to the standards originally required by the Contract Documents.

PART 2 - PRODUCTS

2.1 JOB SET DOCUMENTS

- A. Promptly following receipt of the Owner's Notice to Proceed, secure from the Engineer, at no charge to the Contractor, one complete set of all Documents comprising the Contract.

PART 3 - EXECUTION

3.1 MAINTENANCE OF JOB SET

- A. Immediately upon receipt of the job set described in above paragraph titled "JOB SET DOCUMENTS", identify each of the Documents with the title, "RECORD DOCUMENTS - JOB SET".
- B. Preservation:
 1. Considering the Contract completion time, the probable number of occasions upon which the job set must be taken out for new entries and for examination, and the conditions under which these activities will be performed, devise a suitable method for protecting the job set to the approval of the Engineer.
 2. Do not use the job set for any purpose except entry of new data and for review by the Engineer.
 3. Maintain the job set at the site of Work as that site is designated by the Engineer.
- C. Field work and making entries on Job Set Drawings:
 1. Use erasable colored pencil, preferably red (not ink or indelible pencil) to delineate changes.
 2. Show by station number location of all fittings, valves, service locations, etc.
 3. Reference all fittings and valves at least to two aboveground items reasonably safe from being relocated and indicate such references on the drawings.
 4. Reference all pipelines from the center of the parallel roadway at least every 100 feet or where changes occur in the direction of the pipeline.
 5. Reference all bores from the center of the roadway to the beginning and end of the casing and ductile iron pipe. Depths of bury must also be provided.
 6. Reference all stream crossings and their distance from the center of the parallel roadway and the bridge or other obstruction. A profile of the stream crossing shall also be provided to show the depth of the pipeline under the stream.
 7. Field measure and reference all fittings and valves to two aboveground items reasonably safe from being relocated and indicate such references on the drawings.
 8. Gravity sewers and storm sewers
 - a. Provide survey grade state plane Geographic Information System (G.I.S.) electronic data horizontal coordinates for each hydrant and valve location.
 - b. Provide distance offset from roadway for each location that the waterline installed location differs from that shown on the plans.

c. Comply with Section 01050.

D. Submittal:

1. Submit "marked-up" set of drawings to the Engineer.
2. Make any necessary additions as required by the Engineer.

END OF SECTION

SECTION 02060

ABANDONMENT / DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Demolish and remove from the site those items consisting of abandoned/demolished manholes, old sewer pipe and related items. The sites shall be graded and grassed upon completion of the demolition.
- B. The existing sewer line is to be abandoned in place. Manholes are to be demolished and sewer lines are to be plugged as described in Section 3.2 B below.
- C. Where existing pipe is being replaced with new pipe in the same location, completely remove the existing pipe and manholes from the project area. Do not incorporate the old pipe and/or manholes, or broken pieces thereof, in backfill for the new pipeline.
- D. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.
 - 2. Section 02110 - Clearing and Grubbing
 - 3. Section 02930 - Grassing

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Comply with the Standard Building Code with due regard to the protection of the public and the provision of safeguards during the performance of the work.
- C. Use equipment adequate in size, capacity and numbers to accomplish the work in a timely manner.
- D. Comply with requirements of governmental agencies having jurisdiction.

PART 2 - PRODUCTS

- A. No products are required in this Section.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to the safe, timely, and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 DEMOLITION

- A. General:
 - 1. The Owner may wish to salvage manhole rings and covers. The Contractor shall notify the Owner in advance of demolition and will cooperate with the Owner in removal of these items. The Owner will remove any salvageable items in a timely manner.
 - 3. Prior to start of demolition; carefully study the Drawings and these Specifications.
 - 4. In company with the Owner's representative, visit the site and verify the extent of demolition to be performed under this Contract.
 - 5. Bypass pumping, if required, shall be included in the cost of demolition.
- B. Using only the means and equipment approved for this purpose by the governmental agencies having jurisdiction, demolish and completely remove from the job site the existing construction designated to be removed.
 - 1. Shut off, cap, reroute, and otherwise protect existing public utility lines in accordance with the requirements of the public agency or utility having jurisdiction.
 - 2. Remove rocks larger than 6" diameter, roots, wood, and debris.
 - 3. Existing sewer line segments which are abandoned shall be securely plugged at each end of the abandoned segment by plugging with grout or concrete.
 - 4. For manholes to be abandoned which are located in streets or parking areas, remove the rings and covers, plug inlet and outlet pipes with grout or concrete and fill the manhole with flowable fill to within eight inches of the top. Once the flowable fill has set up, fill the remainder of the manhole with 3,000 psi concrete and patch with asphalt.
 - 5. For manholes to be abandoned in other areas, excavate to a depth of at least four feet and remove from the site. Plug all inlet and outlet pipes with grout or concrete and fill the remainder of the structure with sand or flowable fill. Upper portions are to be filled with clean fill material and compacted.
 - a. Grade the site to blend with the surrounding area.
 - b. Top three inches of the excavated / graded area to be filled with topsoil and immediately grassed.
- C. Demolished material shall be considered to be property of the Contractor and shall be completely removed from the job site.
- D. Use means necessary to prevent dust from becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.
- E. Use any means necessary to protect the public safety during the demolition process.

- F. Use whatever means necessary to protect the adjacent structures from damage during demolition.
- G. Protection of trees: It may become desirable to save certain trees in areas. Consequently, the Contractor shall obtain approval from Engineer prior to removal of significant trees from such areas. The Contractor shall protect existing trees to remain during construction by constructing barricades around such trees as directed.
- H. Erosion control: Construct and maintain erosion control as shown on the Drawings or as needed to control sediment transport from the site and in accordance with the local requirements.

3.3 SITE RESTORATION

- A. Upon completion of the demolition, grade the sites, and any related areas disturbed during demolition, to blend with the surrounding area and grass the area in accordance with Section 02930 of these specifications.

END OF SECTION

SECTION 02110

CLEARING AND GRUBBING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Remove trees, underbrush, undesirable growth, stumps, roots, etc., from the area to the limits shown on the Drawings, as specified herein, and as needed to meet the requirements of the construction shown in the Contract Documents.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 02260 - Erosion and Sediment Control.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Use equipment adequate in size, capacity and numbers to accomplish the work in a timely manner.
- C. Comply with requirements of governmental agencies having jurisdiction.

PART 2 - PRODUCTS

No products are required for this work.

PART 3 - EXECUTION

3.1 AREA INCLUDED

- A. All roadway right of ways affected by the project and any other areas as indicated on the Drawings.

3.2 PROCEDURES

- A. Clearing and grubbing: The entire area within the limit lines described above shall be cleared and grubbed. Remove all incidental vegetation, trees, brush, stumps, etc., from the area. All debris from this operation shall be disposed of off the Owner's property or right-of-way. There will be no burning of debris allowed.

- B. Selective clearing shall be done in areas where directed by the Owner or Engineer. Selective clearing shall consist of removing vegetation, brush, stumps, etc., from the area. Selected trees shall be left standing and care shall be taken not to damage trees to be left. All debris from this operation shall be disposed of off the Owner's property or right-of-way. Grubbing will not be required in areas designated for selective clearing.
- C. Removal of trees and shrubs: All trees to be removed shall be felled in such a manner as to avoid injury to remaining trees and to other features not proposed for removal. Trees shall be cut up and the trunks, limbs, and other debris shall be removed from the site. Undesirable shrubs and small trees shall be selectively removed as directed.
- D. Stumps and roots: All stumps and roots larger than 2" in diameter shall be completely removed by grubbing except in areas of building site, parking areas and drives; they may be cut off not less than 18" below any subgrade. The area of operation then shall be cleared of resulting debris and matted roots, weeds and other extraneous matter and such shall be hauled away from the site. Generally, all material that cannot be compacted to 95% of maximum density in all classes shall be removed and replaced with select backfill.
- E. Protection of trees: It may become desirable to save certain trees in areas where cut or fill is eighteen inches or less and in parking areas. Consequently, the Contractor shall obtain approval from Engineer prior to removal of significant trees from such areas. The Contractor shall protect existing trees to remain during construction by constructing barricades around such trees as directed.

Note: Protect all trees and shrubs immediately adjacent to temporary construction easement.

- F. Erosion control: Install and maintain erosion control facilities in accordance with the Drawings and Specifications.

SECTION 02210

SITE GRADING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Cut, fill, excavate, backfill, compact and grade the disturbed areas to bring the sewer line easement to preconstruction lines and grades.
1. The work includes, but is not necessarily limited to:
 - a. Excavations and formations of embankments.
 - b. Dressing of graded areas, shoulders and ditches.
 - c. Sediment and erosion control.
 - d. Grassing of graded areas, shoulders and ditches.
 2. Classification: All excavation shall be performed to the lines and grades indicated on the drawings or described herein. Material determined by the Engineer to be rock in accordance with Section 02221, Trenching, Backfilling For Utilities, Paragraph 3.2 A. will be paid for at the unit price for "Classified Excavation" indicated on the Bid Form.
- B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.
 2. Section 02110 - Clearing and Grubbing.
 3. Section 02221 - Trenching, Backfilling for Utilities.
 4. Section 02260 - Erosion and Sediment Control.
 5. Section 02722 - Sewers: Sanitary, Gravity.
 6. Section 02930 - Grassing
- C. Definitions:
1. Open areas: Open areas shall be those areas that do not include building sites, paved areas, street right-of-way and parking areas.
 2. Maximum density: Maximum weight in pounds per cubic foot of a specific material.
 3. Optimum moisture: Percentage of water in a specific material at maximum density.
 4. Muck: Materials unsuitable for foundation because of organic content, saturation to the extent that it is somewhat fluid and must be removed by dragline, dredge or other special equipment, are designated as muck. No extra payment will be made for muck removal.
 5. Unsuitable material: Unsuitable material is defined as earth material unsatisfactory for its intended use and as classified by the soils technician. In addition to organic matter, sod, muck, roots and rubbish, highly plastic clay soils of the CH and MH descriptions, and organic soils of the OL and OH descriptions, as defined in the Unified Soil Classification System shall be considered as unsuitable material.
 6. Suitable material: Where the term suitable material is used in specification sections pertaining to earthwork, it means earth or materials designated as being suitable for their intended use by soils technicians or the Engineer. Suitable material shall be

designated as meeting the requirements of the Unified Soil Classification System types SW, GW, GC, SC, SM, ML, CL or as designated in these specifications

7. Select material: Select material is defined as granular material to be used where indicated on the drawings or where specified herein consisting of soils conforming to the Unified Soil Classification types SW, SM, GW or GM or as otherwise approved by the Engineer as select fill. Select material shall contain no stones or rubble larger than 1-1/2" in diameter.
8. Crushed stone (gravel): Crushed stone shall be No. 57 aggregate or equal conforming to ASTM C-33.
9. Excavation: Excavation is defined as unclassified excavation of every description regardless of materials encountered.

D. The Contractor must determine for himself the volume of material required by the site.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Comply with requirements of governmental agencies having jurisdiction.
- C. Sloping and Benching shall be completed in accordance with U. S. Department of Labor, Occupational Safety & Health Administration Standards Part 1926 Safety and Health Regulations for Construction, Subpart P – Excavations, Appendix B, Sloping and Benching.

1.3 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01640.

1.4 JOB CONDITIONS

- A. Notification of intent to excavate:
 1. The North Carolina "Underground Damage Prevention Act" requires persons to ascertain the location of underground public utility property prior to excavation or demolition in certain situations. The Act also requires such persons to give timely notice of intent to excavate or demolish prior to commencing such operations. Failure to comply could subject the violator to a civil penalty for each violation of the Act.
 2. Notification of intent to excavate may be given by calling this toll free number: 1-800-632-4949.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Soil material used as fill, backfill, embankments, or site grading shall consist of suitable material as found available on site until such supply of on-site material is depleted.

1. Provide suitable material free from organic matter and deleterious substances, containing no rocks or lumps over 6" in greatest dimension, and with not more than 15% of the rocks or lumps larger than 2-1/2" in their greatest dimension.
 2. Do not permit rocks having a dimension greater than 3" in the upper 6" of fill or embankment.
- B. Suitable materials may be provided from on-site if acceptable material, as approved by the Engineer, is available. Otherwise approved suitable material shall be provided by the Contractor from an off-site source at no additional cost to the Owner.
- C. Select materials may be provided from on-site if acceptable material, as approved by the Engineer, is available. Otherwise approved select material shall be provided by the Contractor from an off-site source at no additional cost to the Owner.

2.2 TOPSOIL

- A. Use topsoil consisting of material removed from the top 3" to 6" of existing on-site soils.
- B. Use topsoil containing no stones, roots or large clods of soil.
- C. Stockpile topsoil separate from other excavated material.

2.3 EQUIPMENT

- A. Use equipment adequate in size, capacity and numbers to accomplish the work in a timely manner without undue waste or damage of material.

PART 3 – EXECUTION

3.1 EROSION CONTROL

- A. Provide protection of the environment during the construction of this project to reduce soil erosion and siltation to the lowest reasonably achievable level. Comply with the requirements of Section 02260 of these specifications.
1. Immediately remove any sediment from wetland areas adjacent to clearing, grading or pipeline installation areas.

3.2 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.3 PREPARATION

- A. Clearing and grubbing: Clear and grub areas to be graded prior to commencement of the grading operations.
- B. Complete any demolition and/or removal work as may be required prior to grading operations.

- C. Dispose of all clearing, grubbing and demolition debris and other deleterious material off the project site.
- D. Topsoil: Strip topsoil to a depth of 3" to 6" without contamination from the subsoil and stockpile topsoil separate from other excavated materials.
 - 1. Transport and deposit topsoil in storage piles convenient to areas that are to receive topsoil.
 - 2. Deposit topsoil in areas that are already graded and will not be disturbed by on-going construction.
 - 3. Dispose of unsuitable or unusable stripped material off-site.
- E. Sampling and preliminary testing:
 - 1. Prior to beginning the grading operations, the Contractor shall submit to the Engineer his proposed sequence of excavation operations.

3.4 FINISH ELEVATIONS AND LINES

- A. Construct areas within the permanent sewer line easement true to grades shown.
 - 1. Where no grade is indicated, shape finish surface to drain as approved by the Engineer.
- B. In undeveloped areas, the degree of finish shall be that ordinarily obtainable from blade grader. In developed or residential areas, provide a smoother finish by hand raking or other methods approved by the Engineer.
- C. Slopes in sloped/benched areas shall be in accordance with Table B-1, Maximum Allowable Slopes of OSHA Standards 1926 subpart P Appendix B except that slopes shall not be steeper than 1 horizontal to 1 vertical.
- D. Do not place fill in wetland areas or in such a manner that impounding or pooling of water will occur.

3.5 GENERAL PROCEDURES

- A. Existing utilities:
 - 1. Unless shown to be removed, locate and protect active utility lines shown on the drawings or otherwise made known to the Contractor prior to excavating. If damaged, repair or replace at no additional cost to the Owner.
 - 2. If active utility lines are encountered and are not shown on the drawings or otherwise made known to the Contractor, promptly notify the Engineer and take necessary steps to assure that service is not interrupted.
 - 3. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost to the Owner.
 - 4. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Engineer and secure his instructions.
 - 5. Do not proceed with permanent relocation of utilities until written instructions are received from the Engineer.

B. Protection of persons and property:

1. Barricade open holes and depressions occurring as part of this Work, and post warning lights on property adjacent to or with public access.
2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
3. Protect structures, utilities and other facilities from damage caused by settlement, lateral movement, washout and other hazards created by operations under this Section.

C. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.

D. Maintain access to adjacent areas at all times.

E. Excavate and backfill in a manner and sequence that will provide proper drainage at all times.

3.6 EXCAVATING (CUTS)

A. Perform excavating of every type of material encountered within the limits of the Work to the lines, grades and elevations indicated and specified herein.

B. Suitable excavated materials:

1. Use suitable materials removed from the excavation as far as practicable in the formation of the embankments, subgrades and other places.
2. Surplus suitable materials from excavations shall be wasted on the site, spreading and leveling as directed or removed from the site. Disposal of surplus material shall be the responsibility of the Contractor.
3. Do not dispose of surplus materials by placing in wetland or floodway areas.

C. Unsuitable excavated material: Remove from the site and dispose of all unsuitable material. Disposal of surplus material shall be the responsibility of the Contractor.

D. Unauthorized excavation:

1. Excavation of material to depths below the grades indicated unless so directed by the Engineer will be deemed unauthorized excavation.
2. Unauthorized over excavation shall be backfilled and compacted without any additional expense to the Owner.

3.7 FILLING AND BACKFILLING (Formation of embankments and dressing of graded areas)

A. Use fills formed of suitable material placed in layers of not more than 6" in depth measured loose and rolled and/or vibrated with suitable equipment until compacted.

- B. Do not place rock that will not pass through a 6" diameter ring within the top 12" of the surface of the completed fill or rock that will not pass through a 3" diameter ring within the top 6" of the completed fill.
- C. Do not use broken concrete, rock (6" in greatest dimension, and with not more than 15% of the rocks or lumps larger than 2-1/2" in their greatest dimension) or asphaltic pavement in fills.
- D. Placing and compacting:
 - 1. Place backfill and fill materials in layers not more than 6" in loose depth.
 - 2. Before compacting, moisten or aerate each layer as necessary to provide the optimum moisture content.
 - 3. Compact each layer to required percentage of maximum density for the area.
 - 4. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
 - 5. Place backfill and fill materials evenly adjacent to structures, to required elevations.
 - 6. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around the structures to approximately the same elevation in each lift.
- E. Moisture control:
 - 1. Do not use soil material that is either too dry or too wet to achieve proper compaction.
 - 2. Where subgrade or layer of soil material is too dry to achieve proper compaction, uniformly apply water to surface of soil material such that free water does not appear on the surface during or subsequent to compacting operations.
 - 3. Remove and replace, or scarify and air dry, soil material that is too wet to permit compacting to the specified density.
 - 4. Soil material that has been removed because it is too wet to permit compacting may be stockpiled or spread and allowed to dry. Assist drying by disking, harrowing, or pulverizing until moisture content is reduced to a satisfactory value as determined by moisture-density relation tests approved by the Engineer.
- F. Compaction requirements:
 - 1. Compact soils to not less than the following percentages of maximum dry density as determined in accordance with ASTM D698, Method A (Standard Proctor).
 - a. Lawn and unpaved open areas – 90%.
 - b. Embankments – Top 12" of subgrade, 100%; All other fill material, 98%

3.8 FINISH GRADING

- A. General:
 - 1. Uniformly grade the areas within limits of grading under this Section, including adjacent transition areas.
 - 2. Smooth the finished surfaces within specified tolerance.
 - 3. Grade with uniform levels or slopes between points where elevations are shown on the drawings, or between such points and existing grades.

4. Where a change of slope is indicated on the drawings, construct a rolled transition section having a minimum radius of approximately 8' - 0", unless adjacent construction will not permit such a transition, or if such a transition defeats positive control of drainage.
- B. Grading adjacent to structures: Grade areas adjacent to buildings to achieve drainage away from the structures and to prevent ponding.
- C. Ditches and swales:
 1. Cut accurately to the cross sections, grades and elevations shown.
 2. Maintain excavations free from detrimental quantities of leaves, sticks, trash and other debris until completion of the work.
 3. Dispose of excavated materials as specified herein; do not in any case deposit materials within 3' - 0" of the edge of a ditch.

3.9 FIELD QUALITY CONTROL

- A. Secure the Engineer's construction review and observation and approval of subgrades and fill layers before subsequent construction is permitted thereon.
- B. Field density determinations will be made, at no cost to the Owner, to ensure that the specified densities are being obtained. Field density tests will be performed as determined by the Engineer, considering the following:
 1. One field density test for every 3,000 sq. ft. of fill area.
 2. Other tests as deemed necessary by the Engineer.
- C. If, in the Engineer's opinion based on reports of the testing laboratory, subgrade or fills which have been placed are below specified density, provide additional compacting and testing until specified requirements are met.
 1. Additional testing will be provided by the Owner's selected testing laboratory and all costs for the additional testing will be borne by the Contractor.
- D. Proofrolling:
 1. The Contractor shall proofroll subgrade of areas to receive paving or structures on fill dike in accordance with the following:
 - a. Make not less than 3 passes of a 25 to 50 ton rubber tired roller over the full area.
 - b. Unstable, soft or otherwise unsuitable materials revealed by the proofrolling shall be removed and replaced with satisfactory materials, compacted as specified herein.

3.10 PLACING TOPSOIL

- A. Upon completion of site grading and other related site work, topsoil shall be uniformly spread over the graded or improved areas. Topsoil shall be evenly distributed to conform to final grade elevations.
- B. Place, level and lightly compact topsoil to a depth of not less than 3".

- C. Maintain topsoil free of roots, rocks, debris, clods of soil and any other objectionable material which might hinder subsequent grassing or mowing operations.
- D. Any surplus materials shall be disposed of in approved areas on the sewer line right-of-way or removed from the site.

3.11 GRASSING

- A. Disturbed areas shall be grassed immediately after completion of grading and placement of topsoil in accordance with Section 02930 of these specifications.

3.12 MAINTENANCE

- A. Protection of newly graded areas:
 - 1. Protect newly graded areas from traffic and erosion, and keep free from trash and weeds.
 - 2. Repair and re-establish grades in settled, eroded and rutted areas.
- B. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape, and compact to the required density prior to further construction.
- C. Maintain all grassed areas in satisfactory condition until final acceptance of the Work. Areas not showing satisfactory evidence of germination within two weeks of the seeding date shall be immediately reseeded, fertilized and/or mulched. Repair any eroded areas reseeding as needed.
- D. Place all erosion control devices or measures prior to any land disturbing activity within the drainage area they are located. Periodically check erosion control devices and clean or otherwise remove silt build-up as necessary to maintain them in proper working order. Sediment and erosion control devices are to be inspected at least once every seven calendar days and after any storm event of greater than 0.5 inches of precipitation during any 24-hour period. Maintenance of sediment trapping structures shall be performed as necessary per these inspections. Additional silt fencing or other erosion control measures shall be installed at locations other than those shown on the plans should evidence indicate it necessary.

3.13 MEASUREMENT AND PAYMENT

- A. No separate measurement or direct payment will be made for the work under this Section and all costs for same shall be included in the unit price bid for the item to which it pertains.

END OF SECTION

SECTION 02221

TRENCHING, BACKFILLING FOR UTILITIES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Trench, backfill, and compact as specified herein and as needed for installation of underground utilities associated with the Work.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.
 - 2. Section 02722 – Gravity Sewers

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Use equipment adequate in size, capacity, and numbers to accomplish the work in a timely manner.

1.3 JOB CONDITIONS

- A. Existing utilities:
 - 1. There now exists in the construction areas, waterworks, storm drainage, sanitary sewers, street paving, gas mains and other utilities.
 - 2. Approximate location of certain underground lines and structures are shown on the plans for information only, other underground lines or structures are not shown.
 - 3. Locate these and other possible unknown utility lines using electronic pipe finder, or other approved means.
 - 4. Locate, excavate and expose all existing underground lines in advance of trenching operations.
 - 5. The Contractor will be held responsible for the workmanlike repair of any damage done to any of these utilities in the execution of his work under this Section.
 - 6. The Contractor shall familiarize himself with the existing conditions and be prepared to adequately care for and safeguard himself and the Owner from damage.
- B. Notification of intent to excavate:
 - 1. South Carolina Underground Utility Damage Prevention Act (S.C. Code Ann, 58-35-10, CT-SEQ, Supp. 1978) requires persons to ascertain the location of underground public utility property prior to excavation or demolition in certain situations. The Act also requires such persons to give timely notice of intent to excavate or demolish prior to commencing such operations. Failure to comply could subject the violator to a civil penalty of up to one thousand dollars (\$1,000) for each violation of the Act.

2. Notification of intent to excavate may be given by calling this toll free number: 1-888-721-7877.
- C. Protecting trees, shrubbery and lawns:
1. Trees and shrubbery in developed areas and along the trench line shall not be disturbed unless absolutely necessary, and subject to the approval of the Engineer.
 - a. Any such trees and shrubbery necessary to be removed shall be heeled in and replanted.
 2. Where trenches cross private property through established lawns, sod shall be cut, removed, stacked and maintained in suitable condition until replacement is approved by the Engineer.
 - a. Topsoil underlying lawn areas shall be removed and kept separate from general excavated materials.
- D. Clearing:
1. Perform all clearing necessary for installation of the complete work.
 2. Clearing shall consist of removing all trees, stumps, roots, brush and debris in the rights-of-way obtained for the Work.
 3. All timber of merchantable size shall remain the property of the Owner and shall be trimmed and cut in such lengths as directed and stacked along the edge of the right-of-way.
 4. All other material, including trimmings from above, shall be completely disposed of in a satisfactory manner.
- E. Removing and resetting fences:
1. Where existing fences must be removed to permit construction of utilities:
 - a. Remove such fences and, as the Work progresses, reset the fences in their original location and condition.
 - b. Provide temporary fencing or other safeguards as required to prevent stock and cattle from wandering to other lands.
- F. Restoration of disturbed areas:
1. Restore all areas disturbed by, during or as a result of construction activities to their existing or better condition.
 - a. For existing areas with sod type grasses, replace with new sod. Existing sod may be reused where properly removed and stored.
 2. Do not interpret this as requiring replacement of trees and undergrowth in undeveloped sections of the rights-of-way.
- G. Minimizing silting and bank erosion during construction:
1. During construction, protective measures shall be taken and maintained to minimize silting and bank erosion of creeks and rivers adjacent to the work being performed during construction.

H. Blasting:

1. Store all explosives in a secure manner, complying with all laws, ordinances, and regulations.
2. Contractor shall be responsible for damage caused by blasting operations.

PART 2 - PRODUCTS

2.1 EXCAVATED MATERIALS

- A. Perform all excavation of every description and of whatever substances encountered to depths indicated or specified.
- B. Pile material suitable for backfilling in an orderly manner at safe distance from banks or trenches to avoid overloading and to prevent slides or cave-ins.
- C. Remove and deposit unsuitable or excess materials as directed by the Engineer.

2.2 BACKFILL MATERIALS

- A. Provide from materials excavated for installation of utility.
 1. Select soil material free from organic matter and deleterious substances, containing no rocks or lumps over 2" in greatest dimension for backfill up to 12" above top of utility being covered.
 2. Do not permit rocks larger than 2" in greatest dimension in top 6" of backfill.

2.3 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.
- B. Should the quantity of suitable on-site material be insufficient to complete the work, provide suitable borrow material as approved by the Engineer at no additional expense to the Owner.
- C. Provide select materials from on-site if acceptable material as approved by the Engineer is available on-site. Otherwise, provide approved select material from an off-site source.

PART 3 - EXECUTION

3.1 PROCEDURES

- A. Existing utilities:
 1. Unless shown to be removed, protect active utility lines shown on the drawings or otherwise made known to the Contractor prior to trenching. If damaged, repair or replace at no additional cost to the Owner.

2. If active utility lines are encountered and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
3. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost to the Owner.
4. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Engineer and secure his instructions.
5. Do not proceed with permanent relocation of utilities until written instructions are received from the Engineer.

B. Locations within streets or highways:

1. Comply with South Carolina Department of Transportation's (SCDOT) "Encroachment Permit" issued for the Work, and the South Carolina Department of Transportation's (SCDOT) *"A Policy for Accommodating Utilities on Highway Rights-of-Way"*.
2. Take all precautions and comply with all requirements as may be necessary to protect the improvements, including barricades for protection of traffic.
3. Keep minimum of one lane open to traffic at all times where utility crosses street or highway.

C. Protection of persons and property:

1. Barricade open holes and depressions occurring as part of the Work, and post warning lights on property adjacent to or with public access.
2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout and other hazards created by operations under this Section.

D. Dewatering:

1. Remove all surface and subsurface waters from excavations and maintain the excavation in a dry condition during construction operations.
2. Maintain the ground water level a minimum of 3-feet below the trench bottom during excavation, installation and backfilling.
 - a. Material disturbed below the invert elevation due to improper dewatering shall be removed and replaced with crushed stone or lean concrete at no expense to the Owner.
 - b. Use sumps, pumps, drains, trenching, wells, vacuum or well point system as necessary to maintain the ground water level a minimum of 3-feet below the trench bottom and maintain a dry excavation.
 - c. Dewatering by trench pumping will not be permitted if migration of fine grained natural material (running sand) from bottom, side walls or bedding material will occur.
 - d. Provide monitoring wells sufficient in size, location, number and depth to monitor the ground water level in the construction area during excavation and backfill operations.
 - e. Maintain dewatering operations until backfilling and compaction operations are complete.

3. Dispose of water pumped from excavations in storm drains having capacity, canals, trenches or other approved locations.
 - a. Contractor is responsible for acquiring all permits required to discharge the water and shall protect waterways from turbidity during the operation.
 - b. Prevent flooding of streets, roadways, or private property.
 - c. Provide engines driving dewatering pumps with residential type mufflers.
- E. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.
- F. Maintain access to adjacent areas at all times.

3.2 TRENCH EXCAVATION (Classified)

- A. Remove all materials of whatever substance encountered, additional payment to be made for rock excavation as hereinafter defined and specified.
 1. Rock excavation to consist of the removal and disposal of the following materials:
 - a. Boulders 1/2 cubic yard or more in volume.
 - b. Solid rock.
 - c. Materials that cannot be removed without systematic drilling and blasting, such as rock material in ledges or aggregate conglomerate deposits that are so firmly cemented as to possess the characteristics of solid rock.
 - d. Concrete and masonry structures exceeding 1/2 cubic yard in volume except sidewalks and paving.
 2. Rock excavation does not include:
 - a. Boulders, concrete or masonry structures less than 1/2 cubic yard in volume.
 - b. Hard and compact materials such as cemented gravel and relatively soft or disintegrated rock that can be removed without continuous and systematic drilling and blasting.
 - c. Material removed by intermittent drilling and blasting performed to increase production.
 3. Do not remove material claimed as rock until the Engineer has classified and cross-sectioned same.
- B. Where trenching occurs in existing lawns, remove turf in sections and keep damp. Replace turf upon completion of the backfilling.
- C. Open cut:
 1. Excavate for utilities by open cut.
 2. If conditions at the site prevent such open cut, and if approved by the Engineer, tunneling may be used.
 3. Short sections of a trench may be tunneled if, in the opinion of the Engineer, the conductor can be installed safely and backfill can be compacted properly into such tunnel.
 4. Remove boulders and other interfering objects, and backfill voids left by such removals, at no additional cost to the Owner.
 5. Remove wet or otherwise unstable soil incapable of properly supporting the utility, as determined by the Engineer, to depth required and backfill to proper grade with stone bedding material, at no additional cost to the Owner.
 6. Excavating for appurtenances:

- a. Excavate for manholes and similar structures to a distance sufficient to leave at least 12" clear between outer surfaces and the embankment or shoring that may be used to hold and protect the banks.
 - b. Overdepth excavation beyond such appurtenances that has not been directed will be considered unauthorized. Fill with sand, gravel, or lean concrete as directed by the Engineer, and at no additional cost to the Owner.
- D. Trench to the minimum width necessary for proper installation of the utility, with sides as nearly vertical as possible. Accurately grade the bottom to provide uniform bearing for the utility.
- E. Provide sheeting and shoring necessary for protection of the Work and for the safety of personnel.
 - 1. Remove in units when level of backfilling has reached the elevation necessary to protect the utility work and adjacent property.
 - 2. Sheeting at the bottom of trenches over 10' deep for sewers 15" and larger in size, shall remain in place and be cut off no less than 2" above top of pipe, at no additional cost to the Owner.
- F. Depressions:
 - 1. Dig bell holes and depressions for joints after the trench has been graded. Provide uniform bearing for the pipe on prepared bottom of the trench.
 - 2. Except where rock is encountered, do not excavate below the depth indicated or specified.
 - 3. Where rock is encountered, excavate rock to a minimum overdepth of 4" below the trench depth indicated or specified, and to provide 6" clearance in any horizontal direction from all parts of the utility and appurtenances.
- G. Special requirements relating to excavation for specific types of utilities shall comply with the following:
 - 1. Sanitary or storm sewer lines:
 - a. Comply with requirements of Section 02722 and Section 02721.
 - b. Do not excavate trench more than 200' ahead of pipe laying, unless permitted by Engineer.
 - c. Maintain trench sides vertical to point not less than 2' above top of pipe.
 - d. Upper portion of trench may be sloped to any width which will not cause damage to adjoining structures, utilities, pavements or private property.
 - 2. Waterlines and Sewers, Sanitary Pressure: (Force Main):
 - a. Comply with requirements of Section 02660.
 - b. Grade trenches to avoid high points, unless otherwise indicated.
 - c. Provide minimum cover of 36".
 - d. Provide minimum clearance of 6" between pipe walls and trench wall or sheeting and bracing lines.
 - e. If minimum cover of 36" cannot be provided, then thermoplastic piping may not be used. Use ductile iron piping or other Engineer-approved material.
 - 3. Electrical conduit:
 - a. Provide depth of cover shown or minimum cover of 36", whichever is greater.

- b. Where minimum cover only is required, carry excavations to depths necessary to properly grade the conduit on tangents and vertical curves as directed by the Engineer.
 - c. Provide minimum clearance of 12" between conduit and trench wall or sheeting and bracing lines.
 - d. If minimum cover of 36" cannot be provided, then thermoplastic piping may not be used. Use ductile iron piping or other Engineer-approved material.
- H. Comply with pertinent OSHA regulations in regards to the excavation of utilities.

3.3 BACKFILLING

A. General:

- 1. Backfill trenches and excavations immediately after the pipes are laid, unless other protection is directed or indicated.
- 2. Select and deposit backfill materials with special reference to the future safety of the pipes.
- 3. Reopen trenches which have been improperly backfilled, to a depth as required for proper compaction. Refill and compact as specified, or otherwise correct to the approval of the Engineer.
- 4. Surplus material shall be disposed of as directed by the Engineer.
- 5. Original surface shall be restored to the approval of the Engineer.
- 6. Maintain proper dewatering during backfill and compaction operations.

B. Lower portion of trench:

- 1. Deposit approved backfill and bedding material in layers of 6" maximum thickness, and compact with suitable tampers to the density of the adjacent soil until there is a cover of not less than 24" over sewers and 12" over other utility lines.
- 2. Take special care in backfilling and bedding operations not to damage pipe and pipe coatings.

C. Remainder of trench:

- 1. Except for special materials for pavements, backfill the remainder of the trench with material free from stones larger than 6" or 1/2 the layered thickness, whichever is smaller, in any dimension.
- 2. Deposit backfill material in layers not exceeding the thickness specified, and compact each layer to the minimum density directed by the soil engineer.

D. Adjacent to buildings: Mechanically compact backfill in 6" layers within ten (10') feet of buildings.

E. Under roads, streets and other paved areas:

- 1. Mechanically tamp in 6" layers using heavy duty pneumatic tampers or equal.
- 2. Tamp each layer to a density equivalent of not less than 100% of an ASTM D 698 Proctor Curve.
- 3. Provide additional compaction by leaving the backfilled trench open to traffic while maintaining the surface with crushed stone.

4. Refill any settlement with crushed stone and continue such maintenance until replacement of pavement is authorized by the Engineer.
- F. Undeveloped areas:
1. Backfill in wooded, swampy or undeveloped areas shall be as specified hereinbefore, except that tamping of the backfill above a level 2' over the top of the pipe will not be required.
 2. Mound excavated material neatly over the ditch to provide for future settlements.

3.4 EXCAVATION BY JACKING-BORING

- A. Install casings where indicated by jacking and boring.
- B. Comply with Section 02780.

END OF SECTION

SECTION 02225

CONTROLLED DENSITY FILL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide controlled density fill (flowable fill) at the locations shown on the drawings, as specified, and as required for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 02221 - Trenching, Backfilling for Utilities.
 - 3. Section 03300 - Cast-in-Place Concrete.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Comply with the applicable sections of the South Carolina Department of Transportation's Standard Specification for Highway Construction.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
 - 2. Concrete mix design, prepared by the manufacturer of the controlled density fill, showing compliance with the specified properties.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01640.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Provide a slurry of the specified portland cement, fly ash, sand and water.

1. Use portland cement complying with ASTM C 150, Type I or II.
 2. Use fly ash approved by the manufacturer of the flowable fill.
- B. Additives:
1. Admixtures for entrained air may be used if specifically recommended by the manufacturer.
 2. Do not use calcium chloride.
- C. Water: Use water which is potable and free from deleterious amounts of alkali, acid, and organic materials which would adversely affect the setting time or strength of the concrete.
- D. Sand: Use fine aggregate conforming to ASTM C 33-82.
- E. Design the mix to obtain a compressive strength of more than 80 psi at 28 days with an ultimate strength not to exceed 200 psi.
- F. Slump:
1. 7" to 10".
 2. Provide lower slump fill around pipelines to a point above the top of the pipe to prevent floating.

2.2 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Place in forms or cast against earth.
- B. Weather conditions:
1. Avoid freezing before initial set of the concrete.
 2. Do not place at temperatures of less than 40°F, or when freezing conditions are expected in less than 24 hours.
- C. Remove any form materials prior to earth backfilling.
- D. Protect the flowable fill mass and do not permit fill of any kind to be placed thereon until the concrete has attained a compressive strength of at least 30 psi.

3.3 CLEANING UP

- A. Completely remove all traces of concrete from surfaces on which it was not scheduled to be placed.

3.4 MEASUREMENT AND PAYMENT

- A. No separate measurement or direct payment for work under this Section will be made and all costs for same shall be included in the price bid for the item to which it pertains.

END OF SECTION

SECTION 02230
BLASTING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide blasting, blasting monitoring, pre-construction surveys, and post-construction surveys as needed to remove rock during excavation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.
 - 3. Section 02221 - Trenching, Backfilling for Utilities.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section. The Contractor or Subcontractor performing the blasting work shall be properly licensed by the State to purchase, store, and use the explosives in the work.
- B. Contractor is to perform a pre-construction survey of existing structures near the construction area that could be affected by the process of excavating rock by blasting. This survey should include noting and photographing any existing cracks or other irregularities. If requested, this information is to be made available to the Owner in written report form.
- C. The Contractor or Subcontractor shall monitor and record on seismograms peak particle velocity when blasting near structures as required by current State regulations. Monitoring personnel are subject to approval by the Engineer.
- D. No sooner than 10 days but before 30 days after completing the blasting, the contractor shall perform a post-construction survey, similar to the pre-construction survey noting any changes in the pre-construction survey or damages that may have occurred.
- C. Definitions:
 - 1. Rock excavation: Excavation of any hard natural substance which requires the use of explosives and/or special impact tools such as jack hammers, sledges, chisels or similar devices specifically designed for use in cutting or breaking rock, but exclusive of trench excavating machinery.

To be considered as rock excavation, the material shall be continuous; individual boulders or rocks in soil will not be considered rock excavation.

PART 2 - EXECUTION

- 2.1 The blasting charge shall be sufficient to fracture and break the rock so that it can be excavated but it shall be such that it does not damage nearby structures. This may require delayed charges, layered blasting, or other methods.
- 2.2 All blasting work shall be in accordance with current State laws, regulations and procedures.

PART 3 - EXECUTION

3.1 ROCK EXCAVATION:

- A. Notify the Engineer upon encountering rock or similar material which cannot be removed or excavated by conventional earth moving or ripping equipment.
- B. Do not use explosives without written permission from the Engineer.
- C. When explosives are permitted, use only experienced powdermen or persons who are licensed or otherwise authorized to use explosives. Store, handle and use explosives in strict accordance with all regulatory bodies and the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America, Inc.
- D. The Contractor shall be solely responsible for any damage resulting from the use of explosives.
- E. The Contractor is responsible for securing all permits required in performing this work.

3.2 MEASUREMENT AND PAYMENT

- A. No separate measurement or direct payment will be made for the work under this section and all costs for same shall be included in the price bid for the item to which it pertains.

END OF SECTION

BLASTING
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SECTION 02260

EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide protection of the environment during the construction of this project to reduce soil erosion and siltation to the lowest reasonably achievable level.

1.2 GENERAL

- A. Exercise every reasonable precaution, throughout the life of the project, to prevent the eroding of soil and the silting of rivers, streams, lakes, reservoirs, other water impoundments, ground or roadway surfaces, or other property. Erosion control practices to be used for this project are shown on the drawings and are to conform to South Carolina Department of Health and Environmental Control regulations.

PART 2 - PRODUCTS

2.1 CRUSHED STONE

- A. Provide clean, washed, crushed stone for each project Erosion and Sediment Control BMP. Coarse aggregate sizes are in accordance with AASHTO M43 Sizes of Aggregate for Road and Bridge Construction and SCDOT Standard Specifications for Highway Construction (SSHC):
 - 1. EC-06 Stabilized Construction Entrance: 1-inch to 3-inch D50 stone (No. 1 coarse aggregate).

2.2 GRASSING

- A. Comply with Section 02930 – Grassing, and SC DHEC BMP Handbook and BMP Field Manual - Temporary Seeding and Permanent Seeding.

2.3 SILT FENCE

- A. Provide silt fence for each project Erosion and Sediment Control BMP. The geotextile filter fabric must conform to the SCDOT Standard Specifications for Highway Construction (SSHC), Section 815.06 and must be listed on the SCDOT Material Approval Sheet No. 34:
 - 1. Silt Fence:
 - a. Limit splices in filter fabric using continuous rolls whenever possible.
 - b. Whenever splices are necessary a minimum overlap of 6" is required and all splices must occur at a post so that the integrity of the silt fence is not compromised.
 - c. Silt fences should be continuous and transverse to the flow. The silt fence should follow the contours of the site as closely as possible. Place the fence such that the water cannot runoff around the end of the fence.

2. Double Silt Fence: Same as EC-03 Silt Fence, two rows with approximately 1'-6" horizontal separation.
 3. EC-07 Type A – Filter Fabric Inlet Protection: Same as EC-03 Silt Fence.
- B. All silt fences shall be provided with woven wire reinforcement. Woven wire shall conform to the requirements of ASTM A116, Class I zinc coating for wire. Each woven square shall measure 5.33" X 12". The top and bottom wires shall be 10 gauge. All other wires shall be 12-1/2 gauge.
1. Securely attach woven wire to posts with wire ties.
 2. Securely attach filter fabric to top of woven wire and at posts with wire ties.

2.4 EROSION CONTROL BLANKET (ECB)

- A. The erosion control blanket must conform to the SCDOT Standard Specifications for Highway Construction (SSHC) 815.04 and must be listed on the SCDOT Material Approval Sheet No. 55:
- B. Use erosion control blanket S150, from North American Green or approved equal.
1. Use Biostakes where staples are required or indicated on the drawings for stabilization.
 - a. Staple in pattern recommended by blanket manufacturer.
 2. Staple locations must be clearly marked on the blanket when stakes are used.

2.5 SEDIMENT TUBE

- A. Provide sediment tubes for each project Erosion and Sediment Control BMP. The sediment tube must conform to the SCDOT Standard Specifications for Highway Construction (SSHC) and Supplement Specification Sections reference and must be listed on the SCDOT Material Approval Sheet No. 57:
1. EC-05 Sediment Tube: Sediment tube, SCDOT Supplemental Specification for Sediment Tube Specifications dated November 4, 2004.
 2. EC-07 Type A – Sediment Tube Inlet Protection: Sediment tube, SCDOT Supplemental Specification for Sediment Tube Specifications dated November 4, 2004.

2.6 FILTER FABRIC

- A. Provide non-woven geotextile fabric for each project Erosion and Sediment Control BMP. The non-woven geotextile fabric must conform to the SCDOT Standard Specifications for Highway Construction (SSHC), Specifications Section 804.11, Supplement Sections referenced and must be listed on the SCDOT Material Approval Sheet No. 44:
1. EC-06 Stabilized Construction Entrance: Non-woven geotextile fabric, SCDOT SSHC Specification Section 804.11, Class 2, Type C unless otherwise shown or specified and Supplemental Specification for Stabilized Construction Entrance dated July 7, 2005.

PART 3 - EXECUTION

3.1 GENERAL

- A. Construct and maintain all erosion control measures until the substantial completion of the project.

3.2 TEMPORARY CONSTRUCTION ENTRANCE/EXIT

- A. Construct a gravel area or pad at points where vehicles enter and leave a construction site.
- B. Clear the entrance and exit area of all vegetation, roots, and other objectionable material and properly grade and place gravel to the grade and dimensions shown on the plans.
- C. Construct drainage channels to carry water to a sediment trap or other suitable outlet.
- D. Use geotextile fabrics to improve stability of the foundation in locations subject to seepage or high water table.
- E. Maintain the gravel pad in a condition to prevent mud or sediment from leaving the construction site by periodic top dressing with two inches of stone.
- F. After each rainfall, inspect any structure used to trap sediment and clean it out as necessary.
- G. Immediately remove objectionable materials spilled, washed, or tracked onto public roadways.

3.3 TEMPORARY GRASSING

- A. Provide a temporary cover for erosion control on disturbed areas within 14 days after construction activity is complete unless construction activity is going to resume within 21 days in accordance with Section 02930.
 - 1. Provide soil test for pH. Lime is required if pH is less than 5.
 - 2. Provide fertilizer.
- B. This practice applies to cleared areas, diversions, dams, temporary sediment basins, temporary road banks, and topsoil stockpiles where vegetation is needed for less than 1 year.
- C. Provide grassing on slope 5% or greater within 14 days of disturbance. Comply with Section 02930.

3.4 SILT FENCE

- A. Provide silt fence barrier where shown on the plans and on utility construction parallel to the disturbed trench where perpendicular sheet flow runoff occurs on disturbed areas with slopes greater than 4%.
- B. Place at the extreme limits of the area to be disturbed as shown.

- C. Construct temporary sediment barriers of filter fabric, buried at the bottom, stretched and supported by posts and install below small disturbed areas as indicated on the drawings to retain sediment by reducing the flow velocity to allow sediment deposition.
- D. Space posts 10'-0" on center, maximum or as indicated on the drawings.
- E. Remove sediment deposits prior to reaching one-third height of the fence.
- F. Monitor site frequently and place additional silt fencing should evidence indicate that erosion is about to occur at locations other than those shown on plan.

3.5 INLET PROTECTION

- A. Construct temporary sediment barriers around storm drain curb inlets using block and gravel as indicated on the drawings.
- B. Construct metal frame barriers around grate and frame of drop inlets as indicated on the drawings.
- C. Inspect structure after each rainfall and repair as required.
- D. Remove sediment when trap reaches one-half capacity.
- E. Remove structure when protected areas have been stabilized.

3.6 EROSION CONTROL BLANKET

- A. Provide on areas as shown on the plans or on all embankments with slopes equal to or steeper than 2-1/2:1.
- B. Provide on all stream banks from top of bank to bottom of bank on all streams, creeks, drainage swales and other storm water channels and where shown on the wetland delineation on the drawings.

3.7 SEDIMENT TUBE

- A. Provide sediment tube check dams and temporary berms and other BMPs as indicated on the plans or directed by the Engineer.

3.8 MAINTENANCE

- A. Place all erosion control devices or measures prior to any land disturbing activity within the drainage area they are located.
- B. Inspect erosion control devices every seven days and clean or otherwise remove silt buildup as necessary.
- C. Clean and maintain all erosion and sediment control BMPs as recommended and prior to rainfall events.
- D. Dispose of all sediment and other debris in an acceptable manner and above the 100 year flood plain.

3.9 REMOVAL

- A. Remove temporary structures after protected areas have been stabilized.

END OF SECTION

SECTION 02270

RIP-RAP

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Furnishing all labor, materials, and equipment and performing all operations in conjunction with placing protective coatings of broken stone in accordance with these specifications and in conformity with the lines, grades and thicknesses shown on the plans or established by the Engineer.
- B. Related work: Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.

PART 2 - PRODUCTS

2.1 STONE FOR HAND PLACED RIP-RAP

- A. Provide rip-rap which:
 - 1. Has thickness of 12" minimum.
 - 2. Weighs a minimum of 25 lbs. to a maximum of 150 lbs.
 - 3. Has at least 60% of stone weighing more than 60 lbs.

2.2 GROUTED RIP-RAP

- A. Stone to conform to the requirements for hand placed rip-rap.
- B. Mortar for grout shall consist of one part portland cement and three parts sand.
- C. Water content of the grout shall be such that permits gravity flow into the voids with limited spading and brooming.

2.3 FILTER FABRIC

- A. Provide Mirafi 600X or approved equal.

PART 3 - EXECUTION

3.1 HAND PLACED RIP-RAP

- A. Where thickness is not shown on the plans, it shall be 12".
- B. The slope upon which this rip-rap is to be placed shall conform with the cross section shown on the plans or as directed by the Engineer.
- C. Properly compact depressions that may be filled in trimming and shaping the slope.
- D. Install filter fabric, lapping sides 12".
- E. Begin placing in a trench at least 2' below the toe of the slope.
- F. Firmly imbed against the slope and the adjoining piece with the sides in contact and with broken joints.
- G. Fill the spaces between the larger pieces with spalls of suitable size, thoroughly ram into place.
- H. The finished surface shall present an even, tight surface true to line, grade and section.

3.2 GROUTED RIP-RAP

- A. The preparation and placement shall be the same as specified above for hand placed rip-rap.
- B. All voids between stone shall be filled with mortar to a depth of not less than 4" below the surface of the stone.
- C. Surface of the stones shall be left reasonably free of grout.
 - 1. Plastering of the rip-rap will not be allowed.
- D. Spaces between the stones shall be reasonably free of sand or other material and shall be wet during the placing of grout.

END OF SECTION

SECTION 02513

ASPHALTIC CONCRETE PAVING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide asphaltic concrete paving where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 02510 - Stone Base Course.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 60 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section.
 - 2. Certificates, signed by the materials producer and the asphalt paving Subcontractor, stating that materials meet or exceed the specified requirements.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01640.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All materials and products used shall comply with pertinent sections of the South Carolina Department of Transportation's (SCDOT) "Standard Specifications for Highway Construction".

2.2 ASPHALTIC CONCRETE MIXTURE (BINDER COURSE)

- A. Materials and composition of mixture shall comply with Section 402 of the SCDOT's "Standard Specifications for Type 1 Mix".
- B. Provide hot plant mixed asphaltic concrete paving materials.
 - 1. Temperature leaving the plant: 290°F minimum, 320°F maximum.
 - 2. Temperature at time of placing: 280°F minimum.

2.3 ASPHALTIC CONCRETE MIXTURE (SURFACE COURSE)

- A. Materials and composition of mixture shall comply with Section 403 of the SCDOT's "Standard Specifications for Type 1 Mix."
- B. Provide hot plant mixed asphaltic concrete paving materials.
 - 1. Temperature leaving the plant: 290°F minimum, 320°F maximum.
 - 2. Temperature at time of placing: 280°F minimum.

2.4 EQUIPMENT

- A. Comply with requirements of Section 401 of SCDOT's "Standard Specifications".

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
 - 1. Sweep primed surfaces if needed.
 - 2. Adjust frames and covers if needed.

3.2 WEATHER RESTRICTIONS

- A. Do not apply asphalt mixtures to a wet or frozen surface or when air temperature is below 40°F in the shade and falling, or below 35°F in the shade and rising.

3.3 SPREADING AND FINISHING

- A. On arrival at point of use, dump directly into mechanical spreader.
- B. Immediately spread and strike off true to the line, grade and cross section indicated, to such loose depth that when work is completed, the indicated thickness or weight per square yard will be secured.
- C. Correct irregularities while the mixture is still hot.
- D. At locations not readily accessible to mechanical spreaders, acceptable hand spreading methods may be used.
- E. Finished surfaces placed adjacent to curbs, gutters, manholes, etc., shall be approximately 1/4" above the edges of these structures.

3.4 COMPACTION

- A. Perform initial rolling with 3-wheel steel roller or a steel wheel 2-axle tandem roller.
- B. Follow initial rolling with at least four complete coverages by a pneumatic tired roller.
- C. Complete rolling with steel wheel 2-axle tandem roller.
- D. Rolling shall start longitudinally at the sides and proceed gradually toward the center of the pavement, overlapping on successive trips approximately 1/2 the width of the roller.
- E. Use hand or mechanical tampers in areas not accessible to powered rollers.
- F. Surface mixture after compaction shall be smooth and true to the established crown and grade.
- G. Finished paving smoothness tolerance:
 - 1. Free from birdbaths.
 - 2. No deviations greater than 1/8" in 6'.

3.5 PROTECTION OF SURFACE

- A. Allow no traffic on surface until the mixture has hardened sufficiently to prevent distortion.

3.6 FLOOD TEST

- A. Flood the entire asphaltic concrete paved area with water by use of a tank truck or hoses.
- B. If a depression is found where water ponds to a depth of more than 1/8" in 6', fill or otherwise correct to provide proper drainage.
- C. Feather and smooth the edges of fill so that the joint between fill and original surface is invisible.

END OF SECTION

SECTION 02577

PAVEMENT MARKING AND SIGNAGE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Prepare and paint the asphaltic concrete and/or concrete traffic or parking surfaces as indicated or specified and as needed for a complete and proper installation. This will include the following:
 - 1. 18" wide, white stop lines at all stop signs.
 - 2. White parking spaces.
 - 3. Edge of pavement roadway markings.
 - 4. Centerline roadway markings.
 - 5. Median markings.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 02513 - Asphaltic Concrete Paving.

1.2 QUALITY ASSURANCE

- A. Referenced manufacturer is Sherwin Williams of Cleveland, OH. Equal products of other manufacturers may be provided upon approval by the Engineer.
- B. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 15 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section.
 - 2. Manufacturer's specification and other data needed to prove compliance with the specified requirements.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01640.

- B. Deliver all material to site in original, new, unopened containers, labeled and bearing manufacturer's name, stock number, product, brand name, contents by volume for major constituents, instructions for mixing, reducing and application instructions.
- C. Provide secure and adequate storage facilities for all materials stored on site.

PART 2 - PRODUCTS

2.1 PAINT MATERIALS

- A. Provide a waterborne acrylic product conforming to U.S. Bureau of Public Roads' colors and meeting Federal Specification TT-P-1952B, Type I or approved equal.
- B. Provide paint with the following minimum characteristics:
 - 1. Curing mechanism: Coalescence.
 - 2. VOC: Ca 150 gms/Hr., 1.25 lbs./gal.
 - 3. Volume Solids: 45% min.
 - 4. Weight Solids: 65% min.
 - 5. Weight/Gallon: 12.4 min.
- C. Provide colors as indicated on the plans and details or follow SCDOT standard specifications, if not shown on plans.
- D. Provide reflective striping as specified or indicated on the plans containing properly graded glass spheres or beads.

2.2 REFLECTIVE GLASS BEADS

- A. Reflective glass spheres shall be properly graded and meet SCDOT, 1986 Edition Standard Specifications for Highway Construction, Section 710.17.

2.3 PERMANENT RAISED PAVEMENT MARKERS

- A. Provide permanent raised pavement markers in accordance with SCDOT "Standard Specifications for Highway Construction, " Section 605, Latest Edition.

2.4 ROADWAY SIGNAGE AND STRIPING

- A. Roadway signage and striping shall conform to the SCDOT Manual on Uniform Traffic Control Devices for Streets and Highways, Latest Edition.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Surfaces to be painted are to be free of dirt, grease, oil and grit.

- B. New asphalt surfaces are to be adequately cured before application of paint. Apply a test stripe in an inconspicuous area and allow for complete drying to determine readiness for painting.

3.2 ENVIRONMENTAL CONDITIONS

- A. Do not apply paint when the temperature is below 50°F or when the relative humidity is above 85% or when the dew point is within 5°F of the surface temperature.

3.3 MATERIAL PREPARATIONS

- A. Mix and prepare paint material in strict accordance with the manufacturer's recommendations.
- B. When not in use, store materials in tightly covered containers.
- C. Follow all manufacturers' safety, handling and disposal recommendations.

3.4 APPLICATION

- A. Paint with mechanical equipment designed to apply traffic lane material with glass spheres in a uniform width with straight, neat edges.
- B. Apply binder coat at the manufacturer's recommended rate but not less than 15 mils unless approved by the Engineer.
- C. Glass spheres shall be applied, immediately after the striping paint has been applied, through a pressurized glass gun set 1" to 4" behind the paint spray gun. Other methods may be acceptable if approved by the Engineer.
- D. Glass spheres shall be applied at the rate of 6 lbs. per gallon of binder paint.

3.5 PERMANENT RAISED PAVEMENT MARKERS

- A. Install markers in accordance with Section 605 of the SCDOT "Standard Specifications for Highway Construction" Latest Edition.

3.6 PROTECTION OF FINISH

- A. Provide temporary barriers and/or traffic control to prevent damage or traffic pick-up of paint until paint has dried to a state where no traffic pick-up occurs.

3.7 TOUCH UP

- A. After complete drying of the initial paint application, touch up any damaged areas being careful to maintain uniform stripe alignment.
- B. Remove or paint over in black any excess spray, spills, or traffic tracking of paint into areas not intended to receive paint.

END OF SECTION

SECTION 02615

REMOVING AND REPLACING PAVEMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Removal and replacement of existing pavements for installation of utility lines, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.
 - 2. Section 02221 - Trenching, Backfilling for Utilities.
 - 3. Section 02660 - Water Distribution.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods for proper performance of the work of this Section.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01640.

1.5 WARRANTY

- A. All removed and replaced pavement work within the South Carolina Department of Transportation (SCDOT) rights-of-way shall be warranted for two years beginning on the date of acceptance by the SCDOT.
- B. All removed and replaced pavement work within individual county road rights-of-way shall be warranted for two years beginning on the date of acceptance by the individual county.

PART 2 - PRODUCTS

2.1 CONCRETE

- A. Comply with Section 03300, using strength specified herein.

2.2 ASPHALTIC CONCRETE

- A. Use Types 1 and 2 complying with South Carolina Department of Transportation Standard Specifications, Section 403.

2.3 AGGREGATE BASE COURSE WITH PRIME

- A. Comply with applicable portions of South Carolina Department of Transportation Standard Specifications, Section 306.

PART 3 - EXECUTION

3.1 GENERAL

- A. Remove to neat lines and dispose of as directed.
- B. Replace with bases and pavements similar to type removed, unless otherwise indicated.

3.2 CUTTING

- A. Concrete pavement or base:
 - 1. Cut on straight and true lines, to a minimum depth of 2", using powered concrete saw.
 - 2. Shear off remaining depth with pneumatic tools.
- B. Concrete sidewalks shall be removed back to the nearest joint on each side of the crossing.
- C. Asphaltic concrete pavements: Cut to straight and true lines with powered concrete saw.

3.3 REPLACEMENT

- A. Concrete pavements:
 - 1. Use 3000 psi concrete.
 - 2. Replace to 6" below existing slab and undercut each edge 6" to form shelf.
 - 3. Finish surface to match existing surface.
- B. Concrete sidewalks:
 - 1. Replace with 3000 psi concrete.
 - 2. Depth shall be equal to existing section removed, but not less than 4".
 - 3. Finish surface to match existing sidewalk.
- C. Flexible pavements (Ditch Line) – Secondary and Primary Roads:

1. Compact subgrade thoroughly.
2. Undercut each edge 6" to form a shelf.
3. Place 8" 2500 psi concrete leaving surface rough and depressed 2".
4. Top with 2" of asphaltic concrete.

D. Flexible pavements (Ditch Line) - Driveways:

1. Compact subgrade thoroughly.
2. Place 8" deep aggregate base course with prime.
3. Top with 2" of asphaltic concrete.

E. Flexible pavements (Resurfacing):

1. In some instances where utilities are installed within existing pavements, resurfacing of the entire width of the original pavement will be required.
2. Replace pavement in ditch line as specified above.
3. Prime and resurface with 1 1/2" of asphaltic concrete.
4. Taper resurfacing to existing pavement evenly for a distance of 50 feet beyond repaired area.
5. Comply with Section 02513.

END OF SECTION

SECTION 02722

SEWERS: SANITARY, GRAVITY

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide gravity sanitary sewer as shown on the drawings, specified herein, and needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.
 - 2. Section 02221 - Trenching, Backfilling for Utilities.
 - 3. Section 02930 - Grassing.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section.
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01640.
- B. Storage of PVC pipe:
 - 1. Store in unit packages as received from manufacturer until just prior to use.
 - 2. Stack units in such a manner as to prevent deformation to pipe barrel and bells.
 - 3. Protect from direct sunlight by covering with opaque material if storage period will exceed six weeks.
- C. Avoid severe impact blows, gouging or cutting by metal surfaces or rocks.

1.5 ORDER AND ACCEPTANCE OF WORK

- A. Engineer shall direct on what line or street the Contractor shall work and the order thereof.
 - 1. Generally, Work shall commence with outfalls, to mains, thence to laterals.
- B. Owner reserves right to accept and use any portion of Work whenever it is considered to be in the public interests to do so.

1.6 PROTECTION OF OTHER UTILITIES

- A. Location:
 - 1. Approximate location of certain known underground lines is shown.
 - 2. Existing small lines not shown.
 - 3. Locate small and other possible utility lines using electronic pipe finder, or other approved method.
 - 4. Excavate and expose existing underground utilities ahead of trenching operations.
- B. Repair or replace any damaged utility line or structure at no additional cost to Owner.

1.7 CONFLICTING UTILITIES

- A. Remove and/or relay conflicting utilities, when so directed by the Engineer, at the expense of the Owner.
- B. Where alterations to existing utilities are shown to avoid conflicts, make alterations at no cost to Owner.

1.8 JOB CONDITIONS

- A. Work under this Section may require construction or work in a confined space, defined as any space having one or more of the following characteristics:
 - 1. Limited openings for entry and exit.
 - 2. Unfavorable natural ventilation.
 - 3. Not designed for continuous worker occupancy.
- B. The Contractor shall have on the job site at all times the following minimum safety equipment:
 - 1. Gas monitor capable of testing and detecting for combustible gas, oxygen deficiency and hydrogen sulfide.
 - 2. Confined space access and retrieval winch system.
 - 3. Ventilating fan with large diameter ventilating hose.
 - 4. Supplied air respirator, MISHA/NIOSH approved type.
 - 5. Safety harness and lifelines.

This equipment to be available for use by the Contractor, Engineer and Owner for the duration of the project.

- C. All entries into or work within confined spaces to be conducted in accordance with the U.S. Department of Health and Human Services/National Institute for Occupational Safety and Health [DHHS (NIOSH)] Publication No. 87-113, A Guide to Safety in Confined Spaces.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Pipe shall be subject to Engineer's observation, at plant, trench or other point of delivery, for culling and rejecting pipe, independent of laboratory tests, not conforming to specifications.
- B. Rejected pipe will be marked by the Engineer and Contractor shall remove it from project site.

2.2 PIPE AND FITTINGS

- A. Use any pipe material specified herein, except where use of a particular pipe material is indicated on the Contract Drawings.
- B. Ductile-iron pipe and fittings (DIP):
 - 1. Comply with ANSI/AWWA C150/21.50 and ANSI/AWWA C151/21.51, latest revision.
 - 2. Wall thickness in accordance with Table 50.5 of ANSI/AWWA C150/A21.50, depth of cover indicated and Type 3 bedding conditions, minimum Pressure Class.
 - 4" – 12" Pressure Class 350
 - 14" – 20" Pressure Class 250
 - 24" Pressure Class 200
 - 30" – 64" Pressure Class 150
 - 3. Use mechanical or push-on joints complying with ANSI/AWWA C111/A21.11 as modified by ANSI/AWWA C151/A21.51.
 - 4. Use rubber gaskets and lubricant complying with ANSI/AWWA C111/A21.10.
 - 5. Use wall thickness in accordance with table included herein for depth and bedding conditions.
 - 6. Use fittings with pressure rating of 150 psi, complying with ANSI/AWWA C110/A21.10.
 - 7. Use lining complying with the following:
 - a. Amine cured Novalac Epoxy polymeric lining, 40 mils nominal thickness. The standards of quality are based on Protecto 401 by Vulcan Painters, Birmingham, Alabama or Corrosion-Clad Polymer Lining No. 210 by Seauereisen Cements, Pittsburgh, Pennsylvania.
- C. Polyvinyl chloride pipe and fittings (PVC):
 - 1. Use integral wall bell and spigot, minimum of SDR35, complying with ASTM 3034.
 - 2. Use elastomeric gasket joints, providing watertight seal.
 - 3. Furnish pipe in 12.5 or 20-foot lengths.

2.3 MANHOLES

- A. Use precast manholes:

1. Provide reinforced precast concrete ring and eccentric cone sections complying with ASTM C 478 and the following.
2. Use portland cement complying with ASTM C 150, Type II.
3. Cast base slab monolithically with walls.
4. Design flat slab top sections for HS-20 traffic loadings.
5. Cast ladder rungs into the units.
 - a. Embed a minimum of 3".
 - b. Maximum spacing - 16".
6. Provide tongue and groove with vulcanized butyl rubber sealant or O-ring rubber gasketed joints.
7. Cast or factory cut pipe opening in manholes:
 - a. Provide flexible pipe boot conforming to ASTM C923M.
 - b. Attach boot to piping with dual stainless steel straps.
 - c. All other hardware to be stainless steel.
 - d. Provide Kor-N-Seal or equal.
8. Size lift holes and inserts for a precision fit with the lift devices.
 - a. Holes shall not penetrate through the manhole wall.
 - b. Comply with OSHA Standard 1926.704.
9. Provide flat slab tops where manhole depth is less than 4'0".

B. Steps:

1. Provide polypropylene plastic steps reinforced with 3/8" diameter steel rod, M.S.A. Industries, Inc. Model PS-K, or equal.
2. Provide steps having non-skid top surfaces, safety slope at each end, minimum width of 10" and not less than 5" projection from wall.

C. Exterior joint collar:

1. Install an exterior joint collar on all manhole joints.
2. Provide a 12" wide band.
 - a. Provide an outer layer of polyethylene with an under layer of rubberized mastic reinforced with a woven polypropylene fabric.
 - b. Provide a peelable protective paper against the mastic that is removed when the collar is applied to the joint.
 - c. Design the collar so that when it is applied around the joint the ends overlap at least 6".
3. Provide SealWrap Exterior Joint Sealer as manufactured by Mar-Mac Manufacturing Company or an approved equal.

D. Frames and covers:

1. Provide gray iron castings, complying with ASTM A 48, Class 35B iron and AASHTO M-306.
2. Provide a minimum recycled material content of 75 consisting of post-consumer material.
3. Castings shall be of uniform quality, free from sand holes, gas holes, shrinkage, cracks and other surface defects ground smooth and clean by shot blasting.
4. Cast or machine bearing surfaces between rings and covers with such precision to prevent rocking.
5. Casting dimensional tolerances shall be +/- 1/16" per foot.

6. Conduct a first article proof load test and make the results of that proof load available upon request.
 - a. Conduct in accordance with the method and procedure outlined in AASHTO M-306.
 - b. Test casting on a suitable and calibrated load testing machine. Casting shall hold a 40,000 pound proof load for one minute without experiencing any cracks or detrimental permanent deformation.
 - c. Maintain test results for each lot of castings by the foundry for a minimum of seven years. Make available upon request.
7. Provide inspections in accordance with AASHTO M-306 and furnish results of these tests upon request.
8. Furnish a foundry certification stating that samples representing each lot have been tested, inspected, and are in accordance with this specification.
9. Each casting shall be identifiable and show, at a minimum, the following: name of the producing foundry, country of manufacturer, ASTM material designation, recycle symbol, individual part number, cast or heat date.
10. Provide frame weighing not less than 155 lbs. with inside opening between 21.8" and 24".
11. Provide circular cover with two "pick" holes, one 1" diameter vent hole, and weighing not less than 125 lbs.
12. Covers to have the words "SANITARY SEWER" cast in the metal.
13. Coat frames and covers with two (2) shop coats of water based bitumastic paint.
15. Provide watertight covers, where indicated, conforming to above requirements.
 - a. Tap for four bolts, countersunk in cover.
 - b. Provide rubber gasket between frame and cover.
 - c. Provide stainless steel bolts.
16. Provide swivel top style manhole frames and covers where indicated on the drawings.
 - a. Provide 24" clear opening.
 - b. No tools required to open.
 - c. Secure frame to manhole with four 3/4" stainless steel anchor bolts.
 - d. Provide bolt down cover with replaceable threads.
 - e. Provide a stainless steel pivoting rod with zinc plated stainless steel nuts.
 - f. Provide o-ring gasket of 60 durometer neoprene with 1500 psi tensile strength.
 - g. Provide East Jordan Iron Works, Inc. Revolution or approved equal.
17. Provide US Foundry MFG Corporation 668 Ring and KL Cover.

E. Precast grade rings:

1. Use Precast Grade Rings to adjust ring and covers to finished grade.
2. No more than 8 vertical inches of grade rings will be allowed per manhole.
3. Conform to ASTM C 478
4. Provide no less than 4" in height.
5. Use cement brick for adjustments less than 4".

F. Precast inverts:

1. Provide precast inverts.

- a. Pipe openings shall provide clearance for pipe projecting a minimum of 2" inside the manhole.
 - b. The height of the transition from the pipe opening to the invert trough shall be equal to one-half of the Opening ID minus Pipe ID, $\pm 1/4$ ".
- 2. The crown of small I.D. pipe shall be no lower than the crown of the outlet pipe.
 - a. When the fall between the inlet and the outlet holes is greater than 4", the inlet end of the trough shall be below the inlet pipe invert and aligned horizontally within 1".
 - b. Form and finish troughs to provide a consistent slope from the pipe outlet to the inlets up to 4" fall.
 - 1) Minimum fall-1".
 - 2) Minimum bending radius of the trough centerline-1.5 times the pipe I.D.
 - 3) Provide a 1/2" radius at the intersection of 2 or more channels.
 - 4) The minimum concrete thickness from the bottom of the trough to the bottom of the base shall be 7".
 - c. Float finish benches to provide a uniform 2-1/2" slope, ± 1 ", from the high point at the manhole wall to the low point at invert trough.
 - 1) Provide a 1/4" radius at the edge of the bench and trough.
 - d. Fill, depressions, high spots, voids, chips, or fractures over 1/4" in diameter or depth with a sand cement paste and finish to a texture reasonably consistent with the formed surface.

2.4 CLEANOUTS

- A. Provide cleanouts on each separate service line.
 - 1. Locate within the Owner's right-of-way.
 - 2. Provide cleanouts of the same diameter as lines in which they are installed up to 4", and not less than 4" for larger pipe diameters.
 - 3. Comply with the latest adopted version of the International Plumbing Code or local codes where applicable.
 - 4. Provide concrete protection pad set at grade.

2.5 SERVICE PIPE FITTINGS

- A. Provide PVC fittings in conformance with the requirements of ASTM D-3034 with minimum wall thickness of SDR35.
- B. Provide PVC material with cell classification of 12454-B or C as defined in ASTM D-1784.
- C. Gaskets will have a minimum cross-sectional area of 0.20 square inches and conform to ASTM F-477.
- D. Provide fittings with socket depths not less than the minimum depths shown in Table 2 of ASTM D-3034 latest revision.

2.6 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 LAYING OUT WORK

- A. Provide all materials, labor, instruments, etc. required to lay out Work.
- B. Prepare "cut sheets" under direct supervision of the Engineer.
- C. Exercise proper precaution to verify figures on the drawings prior to laying out Work. Contractor will be held responsible for any errors therein that otherwise might have been avoided.
- D. Promptly inform Engineer of errors or discrepancies found, in order that proper corrections may be made.

3.2 LOCATION

- A. Sewer lines in relation to water lines must conform to South Carolina Standards for Wastewater Facility Construction R.61-67 section 67-300 paragraph A.14.
- B. Where the sewer location is not located clearly by dimensions on the drawings, locate the sewer:
 - 1. Not closer than 10' horizontally from a water supply main or service line. The distance shall be measured edge to edge.
 - 2. Where it is not practical to maintain a 10' horizontal separation, the sewer pipe may be installed closer to a water main, provided that the water main is in a separate trench or on an undisturbed earth shelf located on one side of the sewer and at an elevation so the bottom of the water main is at least 18" above the top of the sewer.
 - 3. Where sewers are crossing a water main, either above or below, provide a minimum vertical distance of 18" between the outside of the water main and the outside of the sewer.
 - 4. The crossing shall be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints.
 - 5. Where a water main crosses under a sewer, fully encase the sewer pipe for a distance of 10' on each side of the crossing; or
 - 6. Use acceptable pressure pipe with no joint closer horizontally than 3' feet from the crossing. This pipe will be pressure tested to assure watertightness prior to backfilling.
 - 7. Where concrete encasement is used, provide not less than 4" thickness including that on pipe joints.

3.3 INSTALLATION

- A. Trench, backfill and compact for the work of this Section in strict accordance with pertinent provisions of Section 02221 of these specifications, and the following requirements:
 - 1. Maximum trench widths, depths and bedding methods.
 - a. Install all sewers complying with tables for depths of cut and class of bedding included hereinafter.

- b. Where trenches are excavated beyond specified widths, or trench walls collapse, lay sewer complying with requirements of the next better class of bedding at no additional cost to the Owner.
- c. Include cost of special bedding and tamping in unit prices bid for sewer.
2. Ductile-iron pipe:

MAXIMUM DEPTHS IN FEET						
			CLASS OF BEDDING			
			D	C	B	A
PIPE SIZE	MAX. TRENCH WIDTH	CLASS OF PIPE	FLAT BOTTOM TRENCH	TYPE 1 OR TYPE 2	TYPE 1 OR TYPE 2	SPECIAL CONCRETE BEDDING
8"	2'2"	50	24	28	32	35
10"	2'4"	50	15	24	32	35
10"	2'4"	51	24	32	35	35
12"	2'6"	50	16	20	32	35
12"	2'6"	51	20	24	35	35
12"	2'6"	52	28	32	35	35
14"	2'9"	50	14	16	32	35
14"	2'9"	51	16	20	35	35
14"	2'9"	52	24	28	35	35
16"	3'0"	50	13	17	32	35
16"	3'0"	51	17	21	35	35
16"	3'0"	52	21	25	35	35
18"	3'2"	50	11	15	32	35
18"	3'2"	51	15	17	35	35
18"	3'2"	52	17	21	35	35
20"	3'6"	50	11	15	32	35
20"	3'6"	51	13	17	35	35
20"	3'6"	52	17	21	35	35
24"	3'10"	50	10	14	30	35
24"	3'10"	51	12	16	34	35
24"	3'10"	52	14	18	35	35

3. Polyvinyl chloride pipe (SDR35):

MAXIMUM DEPTHS IN FEET					
			CLASS OF BEDDING		
		D	C	B	A
PIPE SIZE	MAX. TRENCH WIDTH	FLAT BOTTOM TRENCH	TYPE 1 OR TYPE 2	TYPE 2* ONLY	SPECIAL CONCRETE BEDDING
4"	2'0"	**	**	30	30
8"	2'2"	**	**	30	30

10"	2'4"	**	**	30	30
12"	2'6"	**	**	30	30
15"	2'10"	**	**	30	30
18"	3'2"	**	**	30	30
21"	3'6"	**	**	30	30
* Class B Bedding (Type 2) shall extend to the top of the pipe.					
** Do not use this Class of bedding for this pipe size and trench width.					

4. Bedding and tamping requirements for the various classes of bedding shall comply with the following specifications:
- a. Class A Bedding - Excavate trench to one-fourth of nominal pipe diameter below pipe grade; lay pipe to grade on concrete blocking; place 2500 psi concrete around pipe for full width of trench up to one-fourth nominal pipe diameter above the invert.
 - b. Class B (Type 1) Bedding - Shape bottom of trench to a level 2" below bottom of pipe; bring bed to proper level by spreading and thoroughly tamping fine granulated moist earth and sand to conform accurately to one-fourth circumference of pipe barrel; provide suitable material if not available from trench excavation; lay pipe, backfill and hand tamp in thin layers to height three-fourths of pipe diameter, using material same as bedding material; complete trench backfill complying with Section 02221.
 - 1) Trenches excavated to excess depths shall be brought to grade with stone or gravel bedding at the Contractor's expense.
 - 2) Exercise care to avoid disturbing pipe grade, alignment or joints at all times.
 - 3) In lieu of this class bedding, Contractor may elect to use Class B (Type 2) bedding.
 - c. Class B (Type 2) Bedding - Undercut 4" below pipe barrel, full width of trench; bring to grade with approved backfill and compacted crushed stone complying with SCDOT Aggregate No. 5; except for PVC sewers, use SCDOT Aggregate No. 57, then:
 - 1) For pipe other than PVC, place stone in six-inch layers to mid-point of pipe, compacting by slicing with shovel.
 - 2) For PVC pipe, place stone (Aggregate No. 57) in six-inch layers to the top of the pipe, compacting by slicing with shovel.
 - 3) Complete trench backfill complying with Section 02221.
 - d. Class C (Type 1) bedding - Shape trench bottom by hand to conform accurately to bottom one-quarter of pipe barrel circumference.
 - 1) Use Class C (Type 2) bedding if unable to properly shape trench bottom.
 - 2) If shaping is not performed accurately, the Contractor will be required to use Class C (Type 2) bedding.
 - e. Class C (Type 2) Bedding - Undercut 4" below bottom of pipe barrel; full width of trench; bring to grade with approved backfill and compacted crushed stone complying with SCDOT Aggregate No. 5; lay pipe; place stone in 6" layers to quarter-point of pipe, compacting by slicing with shovel; complete backfill complying with Section 02221.
 - f. Class D Bedding - Excavate bell holes in flat-bottomed trench; lay pipe; backfill complying with Section 02221.

B. Drain stop:

1. Provide a drain stop at 100' intervals where pipe length is 1000' or less and 1000' intervals where length is greater than 1000' for Class B (Type 2) and Class C (Types 1 and 2) bedding.
2. Drain stop to consist of compacted cohesive clay 2'-0" minimum length at top of bedding material with side slopes no greater than 1:1 to trench bottom.
3. Remove water from excavation prior to placing drain stop.

C. Pipe laying:

1. General:
 - a. Protect pipe during handling against shocks and free fall. Remove extraneous material from the pipe interior.
 - b. Lay pipe by proceeding upgrade with the spigot ends of bell-and-spigot pipe pointing in direction of flow.
 - c. Lay each pipe accurately to the indicated line and grade, aligning so the sewer has a uniform invert.
 - d. Continually clear interior of the pipe free from foreign material.
 - e. Before making pipe joints, clean and dry all surfaces of the pipe to be joined.
 - f. Use gasket lubricants as recommended by the pipe manufacturer.
 - g. Place, fit, join and adjust the joints to obtain the degree of water tightness required.
2. Polyvinyl chloride pipe:
 - a. Select proper bedding class from preceding table as determined by pipe size and depth of cut.
 - 1) Class B (Type 2) or better bedding shall be used for all PVC sewers.
 - b. Comply with ASTM D2321, except as otherwise specified herein.
3. Ductile-iron pipe:
 - a. Select proper bedding class from preceding table as determined by pipe size and depth of cut.
 - 1) Class D bedding limited to maximum pipe size of 24", Class 52 at 14' foot depth.
 - b. Comply with ANSI/AWWA C600, except as otherwise specified herein.
4. Reinforced Concrete:
 - a. Select proper bedding class from preceding table as determined by pipe size and depth of cut.
5. Remove defective pipe and replace with sound pipe, at no cost to the Owner.

3.4 INSTALLATION OF MANHOLES

- A. Set bases level so that walls will be plumb.
- B. Clean bells and spigots.
- C. Apply joint sealer, or ring gasket to wall section(s), set firmly in place to assure watertight joints.
- D. Set risers and cones so steps align.
- E. Tightly connect pipe boot to piping with dual stainless steel straps.

- F. Grout lift holes from the outside using non-shrink grout.
- G. Install exterior joint collar.
 - 1. Follow manufacturer's recommendations.
 - 2. Clean surface.
 - 3. Remove the protective paper and place the band around the manhole, mastic side to the manhole and spanning the joint.
 - 4. Cover exposed strap with the closing flap.
- H. Form the invert channels directly in the concrete of the manhole base, with mortar, or by laying full section sewer pipe through the manhole and breaking out the top half after surrounding concrete has hardened. Smooth the floor of the manhole outside the channels, and slope toward the channels at not less than 1" per foot nor more than 2" per foot.
 - 1. Shape the invert channels to be smooth and semi-circular, conforming to the inside of the adjacent sewer section.
 - 2. Make changes in direction of flow with a smooth curve of as large a radius as the size of the manhole will permit.
 - 3. Make changes in size and grade of channels smoothly and evenly.
 - 4. Slope invert uniformly from invert of inlet to invert of outlet.
- J. Install manhole to grade utilizing precast grade rings.

3.5 DROP MANHOLES

- A. Where indicated, or as directed by the Engineer, construct drop manhole connections, complying with plan details.

3.6 CONNECTIONS TO EXISTING SYSTEM

- A. Construct new manhole as specified, breaking upper half of existing pipe after base of manhole is completed so as not to obstruct flow of the existing pipe.
- B. At existing manhole tie-ins, temporarily block and/or divert sewage flows, perform other miscellaneous work.
 - 1. Use high-early strength cement for mortar, forming proper channels with minimum interruption to service of the existing sewer.

3.7 SERVICE LINES

- A. Connect to street sewers using wye branches and ells as indicated on the plans.
- B. Do not stack service lines vertically over the sewer main.
- C. Provide sufficient fittings to route piping without bending the pipe sections.
- D. The Contractor is responsible for coordinating with the property owner and the utility owner's representative to determine the depth and location of both the sewer line connection and clean out to best provide a sewer service connection point for the property being served.

- E. The Contractor is responsible for locating service lines to avoid conflicts with existing utilities and exposure of line in ditches.

3.8 CLEANOUTS

- A. Secure the Engineer's approval of locations for cleanouts in finished areas prior to installation.
- B. Provide 4" concrete protection pad around cleanout.

3.9 INSPECTIONS AND TESTING

A. General:

1. All sewers will be visually inspected, tested and gauged for infiltration and/or exfiltration.
2. All visible leaks shall be repaired even if infiltration is within allowable limits.
3. Broken or cracked pipe, mislaid pipe and other defects shall be corrected.
4. All repairs, relaying of sewers, etc., required to bring the sewers to specified status shall be made at no additional cost to the Owner.
5. Expense of all testing will be borne by the Contractor.

B. Construction observation:

1. Clean and prepare for observation each block or section of sewer upon completion, or at such other time as the Engineer may direct.
2. Each section between manholes shall show a full circle of light when viewed from either end.

C. Deflection tests:

1. Perform deflection tests on all PVC pipe in the presence of the Engineer.
2. No pipe to exceed a deflection of 5%.
3. Conduct deflection testing after the final backfill, and compaction thereof, has been in place at least thirty (30) days and prior to placing the sewer lines into operation.
4. Conduct the deflection tests using a rigid ball or mandrel having a diameter equal to 95% of the inside diameter of the pipe.
5. Do not use mechanical pulling devices for the deflection tests.

D. Infiltration tests:

1. Conduct tests using V-notch weir, or by direct measurement prior to allowing sewage flows in the line.
2. Close the end of the sewer at upstream structure sufficiently to prevent the entrance of water.
3. Discontinue use of well points or other groundwater pumping operations at least three days prior to testing.
4. Infiltration into the entire system of new sewers or any one trunk, interceptor or outfall sewer, including connecting laterals, or any stretch of sewer shall not exceed:
 - a. 200 gallons per inch of diameter per mile per day.
5. Make tests in presence of the Engineer, giving the Engineer at least three days advance notice.

E. Air testing:

1. Where sewers are installed above the groundwater table, conduct air tests complying with ASTM C 828 for ductile iron and concrete pipe and ASTM F 1417 for PVC pipe.

F. Vacuum Test of Manholes:

1. Vacuum test manholes in accordance with ASTM C-1244.
2. Typical Field Test Procedure.
 - a. The test head gauge shall be placed at the top of the manhole or in accordance with the manufacturer's recommendations.
 - b. A vacuum of 10 in. of mercury shall be drawn on the manhole, the valve on the vacuum line of the test head closed, and the vacuum pump shut off. The time shall be measured for the vacuum to drop to 9 in. of mercury.
 - c. The manhole shall pass if the time for the vacuum reading to drop from 10 in. of mercury to 9 in. of mercury meets or exceeds the values indicated in the Table 1 below.
 - d. If the manhole fails the initial test, necessary repairs shall be made. The manhole shall then be retested until a satisfactory test is obtained.
3. Minimum test times for various diameter manholes.

TABLE 1

<u>Depth of Manhole (feet)</u>	<u>Diameter of manhole (feet)</u>		
	4'	5' <u>Time (Sec.)</u>	6'
To – 8	20	26	33
8 - 10	25	33	41
10 – 12	30	39	49
12 – 14	35	46	57
14 – 16	40	52	67
16 – 18	45	59	73
18 – 20	50	65	81
20 – 22	55	72	89
22 – 24	59	78	97
24 – 26	64	85	105
26 – 28	69	91	113
28 – 30	74	98	121

END OF SECTION

SECTION 02725

BYPASS PUMPING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: The Work covered by this Section consists of providing temporary bypass pumping and performing all related operations in connection with routing the flow of wastewater around pipe segment(s) during construction of replacement sewers.
 - 1. Generally, the sequence of Work will be to set up bypass pumping equipment and piping to allow bypassing of wastewater flows around a section or sections of the existing sewer line; construct the new section(s), cleanup, inspect and test the new section(s); begin use of the new sewers; relocate the bypass pumping equipment and repeat the process.
 - 2. The design, installation and operation of the temporary bypass pumping system shall be the Contractor's sole responsibility.
 - 3. The Owner has no method of control of wastewater flows, including infiltration and inflow, in existing sewer lines.
- B. The purpose of bypassing is to prevent wastewater overflows and provide continuous service to all wastewater customers. The Contractor shall maintain wastewater flow in the construction area in order to prevent backup and/or overflow and provide reliable wastewater service to the users of the wastewater system at all times.
- C. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.
 - 2. Section 02221 - Trenching, Backfilling for Utilities.
 - 3. Section 02260 - Erosion and Sediment Control
 - 4. Section 02722 - Sewers: Sanitary, Gravity

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Comply with requirements of governmental agencies having jurisdiction.
- C. The Contractor shall be responsible for all required pumping, equipment, piping and appurtenances to accomplish the bypass and for any and all damage that results directly or indirectly from the bypass pumping equipment, piping and/or appurtenances. The Contractor shall also be liable for all of the Owners personnel and equipment costs,

penalties and fines resulting from sanitary sewer overflows. It is the intent of these specifications to require the Contractor to establish adequate bypass pumping as required regardless of the flow conditions.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Within 15 calendar days after the Contractor has received the Owner's Notice to Proceed, submit a comprehensive written plan that describes the intended methods, precautions and procedures for bypass pumping and the maintenance of flows during construction.
 - 1. Include sketches or a marked up set of the construction drawings showing the location of bypass pumping equipment for each line segment(s) around which flows are being bypassed.
 - 2. The plan shall include any proposed tanks, pumps, bypass piping, backup plan and equipment, work schedule, monitoring log for bypass pumping, monitoring plan of the bypass pumping operation and maintenance of traffic plan.
 - 3. The plan should address proposed methods of noise control for each pump and/or generator.
- C. The bypass plan shall be approved by the Owner prior to implementation of the bypass.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01640.

1.5 ORDER AND ACCEPTANCE OF WORK

- A. Engineer shall direct on what line or street the Contractor shall work and the order thereof.
 - 1. Generally, Work shall commence with outfalls, to mains, thence to laterals.
 - 2. The Contractor shall cease bypass pumping operations and return flows to the new and/or existing sewer when directed by the Engineer.
- B. Owner reserves right to accept and use any portion of Work whenever it is considered to be in the public interests to do so.

1.6 JOB CONDITIONS

- A. The Contractor should thoroughly familiarize himself with the site, access and security conditions of the project site.

PART 2 - PRODUCTS

2.1 GENERAL

- A. The Contractor shall provide and maintain adequate equipment, piping, tankers and other necessary appurtenances in order to maintain continuous and reliable wastewater service in all wastewater lines as required for construction. The Contractor shall have

tankers, backup pump(s), piping and appurtenances ready to deploy immediately.

2.2 BYPASS PIPING

- A. All piping shall be designed to withstand at least twice the maximum system pressure or a minimum of 50 psi, whichever is greater. During bypassing, no wastewater shall be leaked, dumped, or spilled in or onto, any area outside of the existing wastewater system. When bypass operations are complete, all bypass piping shall be drained into the wastewater system prior to disassembly.

2.3 NOISE CONTROL

- A. Bypass pumps and/or generators shall have a maximum rating of 55 decibels (per bypass set-up) for sound attenuation.

PART 3 - EXECUTION

3.1 GENERAL

- A. The Contractor shall have all materials, equipment and labor necessary to complete the new sewer line installation on the job site prior to isolating the gravity sewer main segment or manhole.
- B. The Contractor shall demonstrate that the pumping system is in good working order and is sufficiently sized to successfully handle flows by performing a test run for a period of 24 hours prior to beginning the Work.

3.2 PERFORMANCE REQUIREMENTS

- A. It is essential to the operation of the existing system that no interruptions in wastewater flow occur throughout the duration of the project. To this end, the Contractor shall provide, maintain and operate all temporary facilities such as tanks, plugs, pumping equipment (both primary and backup units), conduits, all necessary power, and all other labor and equipment necessary to intercept the incoming flow before it reaches the point where it would interfere with his Work, carry it past the Work area and return it to the existing sewer system downstream of his Work.

3.3 TRAFFIC CONSIDERATIONS

- A. The Contractor shall locate bypass pumping suction and discharge lines so as to not cause undue interference with the use of streets, private driveways and alleys to include the possible temporary trenching of piping at critical intersections. Ingress and egress to adjacent properties shall be maintained at all times. Ramps, steel plates or others methods shall be deployed by the CONTRACTOR to facilitate traffic over surface piping. High traffic commercial properties may require alternate methods.

3.4 INSTALLATION AND REMOVAL

- A. The Contractor shall remove manhole sections or make connections to the existing

sewer system and construct temporary bypass pumping structures or facilities only at access locations approved by the Owner as part of the bypass pumping plan.

- B. When plugging or blocking is no longer needed as part of the bypass pumping operation, it is to be removed in a manner that permits blocked wastewater flow to slowly return to normal without surge, to prevent surcharging or causing other disturbances downstream.
- C. When working in manholes, wetwells, tanks or confined spaces potentially containing sewer gases, combustible or oxygen deficient atmospheres, the Contractor shall exercise caution and comply with OSHA requirements.
- D. Bypass pipelines must be located off streets and sidewalks unless expressly approved by the Owner and the Department of Transportation. Locations on road shoulders shall be as approved by the Owner and the Department of Transportation. When the bypass pipeline crosses local streets and private driveways, the Contractor must place the bypass pipeline in trenches and cover with temporary pavement. Upon completion of the bypass pumping operations, the Contractor shall remove all temporary piping, restore all property to pre-construction conditions and restore all pavement. The Contractor is responsible for obtaining any approvals for placement of temporary pipelines or pumping facilities outside of construction easements previously obtained by the Owner.

3.2 BYPASS OPERATION

- A. The Contractor shall plug off and pump down the sewer manhole or line segment in the immediate Work area and shall maintain the wastewater system so that surcharging does not occur.
- B. Where Work requires the line to be blocked beyond normal working hours and bypass pumping is being utilized, the Contractor shall be responsible for monitoring the bypass operation 24 hours per day, 7 days per week. If accepted in the bypass plan by the Owner, any electronic monitoring in lieu of onsite monitoring must be detailed in the comprehensive written plan and approved by the Owner.
- C. The Contractor shall ensure that no damage will be caused to private property as a result of bypass pumping operations. The Contractor shall complete the Work as quickly as possible and satisfactorily pass all tests, inspections and repair all deficiencies prior to discontinuing bypassing operations and returning flow to the sewer manhole or line segment.
- D. The Contractor shall immediately notify the Owner should a sanitary sewer overflow occur and take the necessary action to clean up and disinfect the spillage to the satisfaction of the Owner and/or other governmental agencies. If sewage is spilled onto public or private property, the Contractor shall wash down, clean up and disinfect the spillage to the satisfaction of the Owner and/or other governmental agencies.
- E. When bypassing a pump station, one back-up pump equal to the primary unit shall be required.

END OF SECTION

BYPASS PUMPING

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SECTION 02751

PLANT PIPING, VALVES AND APPURTENANCES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide plant, gravity, pressure, yard and interior piping systems as shown on the Drawings, specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 02221 - Trenching, Backfilling for Utilities.
 - 3. Section 02722 - Sewers: Sanitary Gravity
 - 4. Section 05990 - Miscellaneous Metals.
 - 5. Section 09900 - Painting.
 - 6. Section 11293 - Plug Valves.
 - 7. Section 11298 - Surge Valve.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. All materials in this Section are to be manufactured in the United States.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section.
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
- C. Certified records of manufacturer's pipe tests per Paragraph 2.1B of this Section.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01640.
- B. Storage of PVC pipe:
 - 1. Store in unit packages as received from manufacturer until just prior to use.

2. Stack units in such manner as to prevent deformation to pipe barrel and bells.
3. PVC pipe shall be protected from direct sunlight by covering with opaque material if storage period will exceed six (6) weeks.
4. Protect from severe impact blows, gouging or cutting by metal surfaces or rocks.

1.5 JOB CONDITIONS

- A. Work under this Section may require construction or work in a confined space.
- B. Provide safety equipment as specified in Section 01500.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

- A. Service requirements:
 1. Pipe materials for the various services shall be as indicated on the drawings.
 2. Design pressures:
 - a. Pipe, regardless of type of material, shall be designed for minimum of 150 psi internal pressure, safety factor of 2 with an additional surge allowance pressure of 100 psi, and for trench loads as indicated on the drawings.
- B. Factory testing:
 1. Test each type of pipe material in accordance with the requirements for that particular type of pipe as specified hereinafter.
 2. Certified records of the tests made by the manufacturer or by an approved commercial laboratory shall be furnished to the Engineer for each shipment of pipe delivered to the job site.
- C. Lead content:
 1. Any pipe, solder, or flux used shall be lead free (lead free is defined as less than 0.2% lead in solder or flux and less than 8.0% lead in pipes and fittings).
- D. Ductile iron pipe and fittings (DIP):
 1. Provide pipe with a minimum working pressure as indicated in the design pressures specified and complying with ANSI/AWWA C151/A21.51, ASTM A377, latest revision, and the following:
 2. Buried Piping:
 - a. Provide depth of cover indicated and Type 3 bedding conditions, having a wall thickness required for the design pressures specified.
 - b. Provide mechanical or push-on joints complying with ANSI/AWWA C111/A21.11 as modified by ANSI/AWWA C151/A21.51 with rubber gaskets and lubricants complying with ANSI/AWWA C111/A21.11.
 - c. All buried fittings, valves, etc. to be mechanical joint.

- d. Bolts and nuts: Provide Cor-Ten Steel tee head bolts for use on mechanical joints complying with ASTM A242.
- 3. Exposed piping:
 - a. Provide Class 53 minimum.
 - b. Provide flanged joints complying with ANSI/AWWA C115/A21.15, latest revision.
 - c. Provide solid type flanges.
 - d. Provide full face, red rubber, factory cut, 1/16" thick gasket for pipe up to 10" diameter and 1/8" thick gasket for larger sizes.
 - e. Bolts and nuts: Provide standard carbon steel machine bolts, hex head.
- 4. Fittings: Provide 250 psi rated fittings or specials unless otherwise indicated, complying with ANSI/AWWA C110/A21.10 and in accordance with ANSI/AWWA C111/A21.11.
- 5. Restrained joint pipe and fittings:
 - a. Provide restrained joint pipe and fittings on all piping at each fitting, including valve connections and on the pipe joints to a distance of 30' each side of fitting for 12" piping and smaller and to a distance of 60' each side of the fitting for piping over 12".
 - b. Provide one of the following for use with push-on joints;
 - 1) Snap-Lok by Griffin Pipe.
 - 2) Flex-Ring by American Cast Iron Pipe Company.
 - 3) Fast Grip Gasket by American Cast Iron Pipe Company.
 - 4) TR-Flex by U.S. Pipe.
 - 5) Field Lok by U.S. Pipe.
 - c. Provide the following for use with all mechanical joints:
 - 1) Provide retainer glands for use with mechanical joint pipe and fittings.
 - 2) Provide wedge type.
 - 3) Provide ductile iron gland conforming to ASTM A 536-80. Provide split gland where standard gland cannot be installed.
 - 4) Provide ductile iron set screws, heat-treated to a minimum hardness of 370 BHN with twist-off nuts and permanent standard hex head remaining.
 - 5) Provide for the following rated pressure with minimum 2 to 1 safety factor; 3" - 16" 350 psi, 18" - 48" 250 psi.
 - 6) Provide tee-head bolts conforming to ANSI/AWWA C111/A21.11 latest revision.
 - 7) Provide "MEGALUG" as manufactured by EBAA Iron Sales, Inc. of Eastland, Texas or approved equal.
- 6. Lining (All pipes and fittings):
 - a. Sanitary sewer, scum, sludge and wastewater service:
 - 1) Provide lining complying with one of the following:
 - a) Polyethylene lining complying with ANSI/ASTM D-1248, 40 mils nominal thickness or;
 - b) Amine cured Novalac Epoxy polymeric lining, 40 mils nominal thickness. The standards of quality are based on Protecto 401 by Vulcan Painters, Birmingham, Alabama or Corrosion-Clad Polymer Lining No. 210 by Seauereisen Cements, Pittsburgh, Pennsylvania.
- 7. Coatings:
 - a. For buried service provide bituminous coating.
 - b. For exposed locations, provide prime coat per Section 09900.

- E. Stainless steel pipe and fittings, 2-1/2" diameter and smaller:
 - 1. Provide Schedule 40 pipe and fittings.
 - 2. Provide Type 304L.
 - 3. Provide NPT threaded connections.
 - 4. Provide stainless steel unions at all connections to fixtures, pumps, equipment, etc.
 - 5. Provide joint compound for thread sealant.
 - a. Provide Lok-Tite PST or approved equal.
 - b. Submit shop drawings for approval.
- F. Copper pipe and fittings (CP):
 - 1. Provide minimum Type "K", hard drawn, with wrought copper fittings, soldered.
 - 2. In conduit: Provide minimum Type "K", soft copper with brass flared fittings.

2.2 PLUGS OR CAPS

- A. Provide at all pipe ends and unused branches of fittings.
- B. All plugs and caps shall be tapped 2" and provided with 2" plug.
- C. Provide restrained fittings on ductile iron lines.

2.3 LINK SEAL SLEEVE SEAL

- A. Provide sleeve seals where indicated on the plans to seal between pipe sleeves and piping.
- B. Provide glass reinforced nylon plastic pressure plates.
- C. Provide Type 316 stainless steel bolts and nuts.
- D. Provide EPDM sealing element.
- E. Acceptable manufacturer is Link Seal, Type S or equal.

2.4 ADAPTER FLANGES

- A. Provide adapter flanges where indicated on the plans.
- B. Provide high strength ductile iron flange, ASTM A536, Grade 65-45-12.
- C. Provide set screws with a Rockwell hardness of C40-45 converted from Brinnell.
- D. Gasket material:
 - 1. Air lines – Gore-Tex style R rated for 400 degrees for greater.
 - 2. All other lines - BUNA S.
- E. Minimum pressure rating - 150 psi.
- F. Provide adapter flanges with a minimum of a 2 to 1 safety factor.

- G. Provide adapter flanges with MEGA-BOND Restraint Coating System.
1. Wash all adapter flanges and appurtenances in a phosphate wash prior to coating.
 2. Coat with a minimum of two coats of liquid Xylan fluoropolymer coating with heat cure to follow each coat.
- H. Provide Series 2100 Megaflange Restrained Flange Adapter by EBAA Iron or approved equal.

2.5 SERVICE SADDLE

- A. Provide of the following materials:

Body	Type 304 Stainless Steel
Bales and Strips	Type 304 Stainless Steel
Studs	Type 304 Stainless Steel
Hardware	Type 304 Stainless Steel

- B. Provide double-strap for sizes 5" and larger.
- C. Provide Romac 304 and 305 or approved equal.
- D. Connect to pipeline using a 6" stainless steel nipple.
1. Do not use a threaded PVC connection.

2.6 COUPLINGS, BURIED PIPING

- A. Provide couplings where needed to make piping connections and where located on the plans.
- B. Provide cast iron mechanical joint sleeve, full length, minimum 12" long.
- C. Provide ductile iron ASTM A-536 followers.
- D. Provide high strength low alloy steel bolts with heavy semi-finished hexagon nuts to AWWA/ANSI C111/A21.11 standards.
- E. Gaskets to be Grade 30.
- F. Provide Silicone gaskets for air service.
- G. Provide Cor-Ten steel tee head bolts for use on mechanical joints complying with ASTM A242, galvanized in accordance with ASTM A-123.
- H. Provide restrained joints where indicated or specified herein.

2.7 METALLIC DETECTION TAPE

- A. Provide 2" wide metallic detection tape on all buried PVC and HDPE piping.

1. Provide 5.0 mil overall thickness with no less than a 50 gauge solid aluminum foil core.
 2. Foil to be visible from both sides.
 3. No inks or printing extended to the edges of the tape.
 4. Encase printing to avoid ink rub-off.
 5. Tensile strength - 28 lbs/inch.
 6. Use heat set mylar inks.
- B. Locate 12" below ground surface in pipe trench.
- C. Color to be as indicated below:
1. Chemical lines - High visibility safety yellow.
 2. Potable water lines - Safety precaution blue.
 3. Sanitary sewer - Safety green.
 4. Force mains, non-potable water and all other lines - Safety brown.
- D. Wording on tape to indicate pipe contents and repeated a minimum of every 24".

2.8 PIPE HANGERS AND SUPPORTS

- A. All pipe hangers and supports must comply with IBC2003.
- B. Small piping (smaller than 3"):
1. Fabricate hangers and supports from "Unistrut" channels and fittings as specified in Section 05990.
 2. Provide uni-cushion insulated fittings for copper, PVC and stainless steel piping.
- C. Large piping (3" and larger):
1. Pipe stands:
 - a. Provide 304 stainless steel Standon Model S92 Saddle Support by Material Resources, Inc. or equal with Schedule 40 Type 304 stainless steel pipe extension and stainless steel floor flange.
 - b. Mount flange to floor with stainless steel expansion anchors.
- D. All exposed piping shall be provided with supports and hangers of adequate size and configuration to support the piping system.
- E. Inserts, bolts and anchors shall be set into form work for new concrete. Where hanger and anchors are to be supported by existing structures, wedge anchors shall be installed. Anchors shall be Type 316 stainless steel with stainless steel coupling nuts.
- F. Pressure lines shall be secured with straps or reaction blocking to prevent movement.
- G. Provide at all bends each side of couplings.

- H. The maximum distance between supports or hangers shall not exceed:

	Stainless Steel Tubing, PVC	Copper, Stainless Steel, Steel or Ductile Iron
3/8" diameter and smaller	2-1/2'	4'
1/2" diameter	2-1/2'	6'
3/4" and 1" diameter	3'	8'
1-1/4" to 2" diameter	3-1/2'	10'
2-1/2" diameter to 5" diameter	4'	12'
6" diameter and larger	5'	12'

2.9 GATE VALVES

A. General:

1. End connections as required for the piping in which they are installed.
2. Suitable for working pressure of not less than 150 psi.
3. Open by turning counter clockwise.
4. Provide stem extensions, if required, to bring operating nut to within two (2') feet of finished grade.
5. Fully coat all internal ferrous metal surfaces with two part thermosetting epoxy.
6. Provide two-part thermosetting epoxy coating on valve exterior.
7. Provide stainless steel bolting.
8. Valves to be manufactured in the United States.

B. Gate valves 1-1/2" and smaller:

1. Where gate valves of this size are indicated on plans, use ball valves.
2. Above ground: use stainless steel ball valves.
3. Below ground:
 - a. Use 1/4 turn all bronze ball valves with stop" suitable for working pressure of not less than 150 psi.
 - b. Provide 2" square operating nut for valves larger than 1" and a shut-off rod for valves 1" and smaller.
 - c. Provide a valve box.
 - d. Provide Ford Series B11 or approved equal.

C. Gate valves 2" and larger:

1. Use resilient seated wedge valves complying with ANSI/AWWA C509.
2. Provide integrally cast bronze stem nut on resilient seated wedge valves.
3. Suitable for working pressure of not less than 250 psi.
4. Design for external stem failure outside of the valve body or bonnet when excessive closing torque is applied with no failure of the pressure retaining parts per AWWA Section 3.2.
 - a. Factory test with no leakage from either side of the disc.
 - b. Test shell to 500 psig.
5. Provide certified to NSF 61.
6. Resilient wedge valves:

- a. Completely encapsulate resilient iron wedge by an elastomer, without thin spots or voids.
 - b. Provide polymer wedge guide bearing caps bearing surface between the encapsulated wedge and the interior epoxy coating, lowering operation torque and extending service life of the valve.
 - c. The manufacturing plant to have ISO9001 certification.
- D. Buried service: Non-rising stem with 2" metal operating nut with arrow indicating direction of opening.
- E. Exposed: Non rising stem with handwheel operator.
- F. Provide bypass valve where required for pressure and valve size.
- G. Valve operator:
 - 1. Provide one T-handle operator for each four (4) buried valves with nut operator.

2.10 PLUG VALVES

- A. Comply with Section 11293.

2.11 CHECK VALVES

- A. Cushioned swing check valves, 3" and larger:
 - 1. Provide valve body of a one-piece casting, globe pattern, constructed of ASTM A126 Class B cast iron with minimum strength of 30,000 psi.
 - 2. Provide flanged end connections per ANSI B16.1.
 - 3. Provide full pipeline flow area with disc at 23° open position, and allow for a minimum of 60° total disc travel.
 - 4. Provide a circular flanged cover of adequate size to permit field inspection, maintenance, and/or replacement of all internal valve components.
 - 5. Design working pressures to 250 psi.
 - 6. Body seat:
 - a. Material to be Type 316 stainless steel.
 - b. Design seat to permit field replacement.
 - 7. Disc construction:
 - a. Construct of ASTM A126 Class B cast iron with minimum strength of 30,000 psi.
 - b. Provide disc with resilient seat ring for tight shut-off.
 - 1) Disc seat ring shall be of BUNA-N.
 - 2) Attach disc seat ring to disc by means of 18-8 stainless steel follower ring and 18-8 stainless steel fasteners.
 - 3) Design disc seat ring to permit field replacement.
 - c. Attach disc to disc arm by means of a single attachment point.
 - 1) Attachment design shall permit a controlled amount of disc articulation to provide uniform compression of disc seat ring under any pressure condition, up to the maximum working pressure.
 - 2) Rotation of the disc around the attachment point shall not be permitted.
 - d. Construct disc arm of one-piece, ductile iron casting with minimum strength

- of 60,000 psi.
8. Shaft construction:
 - a. Construct of non-hardened, Type 316 stainless steel.
 - 1) Hardened stainless steel or chrome-plated steel shafts shall not be permitted.
 - b. Support shaft in the body by solid bronze bearings mounted in the valve body.
 - 1) Locate shaft and bearings completely out of flowpath through valve.
 - 2) Bearing material shall be UNS C93200 bronze, with minimum strength of 20,000 psi.
 - 3) Bearing/shaft design shall provide sufficient bearing area to prevent bearing wear, deformation, or excessive friction. Use of oil impregnated bearings, grease or oil lubrication, or synthetic bearing materials shall not be permitted.
 - c. Shaft design shall employ stainless steel keys for attachment of disc arm and externally mounted counterweight arm.
 - 1) Use of set screws or clamps shall not be permitted.
 - d. Extend shaft through one (1) side of valve body to allow attachment of external counterweight arm and cushion chamber.
 - e. Seal shaft where it passes through the valve body by means of an externally adjustable packing gland and Teflon packing.
 - 1) O-ring shaft seals shall not be permitted.
 - f. Shaft design shall employ a mechanical locking device for maintaining proper shaft and disc arm alignment within the valve body. The shaft bearings and/or disc arm shall not be used to maintain shaft alignment.
 - g. Provide minimum shaft diameters for each size as follows:

<u>Valve Size</u>	<u>Shaft Diameter</u>
2-1/2"	3/4"
3"	3/4"
4"	7/8"
6"	1"
8"	1-1/4"
10"	1-1/4"
12"	1-1/2"
 9. Cushion chamber construction:
 - a. Attach a cushion chamber to the exterior of the valve body with mechanical linkage connecting the cushion chamber piston to the valve shaft.
 - b. Construct the cushion chamber cylinder tube and piston of bronze.
 - c. Cushioning shall be accomplished by using air as the cushioning media. Use of hydraulic oil or pre-charged air cylinders shall not be permitted.
 - d. The degree of cushioning shall be easily adjustable.
 10. Counterweight arm and counterweight construction:
 - a. Attach a single counterweight arm to the valve shaft.
 - b. The counterweight arm shall employ a stainless steel key to prevent rotation around the valve shaft.
 - 1) Use of set screws or clamps to connect the counterweight arm to the valve shaft shall not be permitted.
 - c. The counterweight arm shall be positioned on the shaft to provide the maximum amount of closing force when the valve is in the seated position, and the minimum amount of closing force when the valve is in the open position.

- d. Sufficient counterweight(s) shall be provided to prevent or minimize slamming of the check valve immediately following shut-down of the pump.
 - 1) The position of the counterweight(s) shall be adjustable on the counterweight arm.
 - 2) The counterweight(s) shall have provision to be locked into position on the counterweight arm.
- 11. Valve shall be completely serviceable in the line, and all internal parts shall be removable through the top cover.
- 12. The valve shall be Figure 250-D as manufactured by G.A. Industries, Inc. or Engineer approved equal.

2.12 AIR RELEASE AND VACUUM VALVES

- A. Provide air release valves where indicated on the drawings and not specified in other sections of these specifications.
- B. Raw wastewater, unfiltered wastewater effluent, and sludge applications:
 - 1. Provide single body universal type with compound lever system to seal both the pressure orifice and the air and vacuum orifice simultaneously.
 - a. Design valve to automatically exhaust large amounts of air and gases while the pipeline or system is being filled and close after the system is purged of air.
 - b. Design valve to re-open to admit air during draining or when a negative pressure exists in the system.
 - 2. Provide valve with minimum 2" inlet, or larger, if shown on the drawings.
 - 3. Design valve to allow minimum contact between operating mechanisms and sewage.
 - a. Provide internal linkage and float of stainless steel.
 - b. Provide a Type 316 stainless steel plug and removable Type 316 stainless steel seat ring in a ductile iron cage.
 - c. Provide plug with a renewable resilient O-ring seat of Buna-N or other suitable material retained in a dovetail groove.
 - d. Provide a single float ball of 18-8 stainless steel, attached to a stainless steel stem by means of a universal connection.
 - 4. Provide air and vacuum valves of the size listed in the schedule or shown on plans with threaded inlet and outlet to 3" size and ANSI B16.1 Class 125 flanged inlet and threaded outlet in larger sizes.
 - 5. Provide body and cover constructed of ASTM A126 Class B cast iron.
 - 6. Tap valve body with 1/2" NPT near the top and 1" NPT near the bottom to permit the installation of flushing attachments and have a 2" NPT plugged port, with cast iron plug, near the base to facilitate cleanout of large solids.
 - 7. Provide flushing attachments to include 1/2" stainless steel flushing valve, 1" stainless steel blowoff valve, 5' of rubber hose and quick disconnect couplings.
 - 8. At 10 lbs. working pressure, design valve to vent not less than 10 scfm of free air. At -4 lbs. of vacuum the design valve to allow an inflow of not less than 65 scfm of air.
 - 9. Provide discharge cowl on all valves located in manholes. All others to have threaded discharge.
 - 10. All piping, nipples, etc., to be Schedule 40, Type 316 stainless steel.
 - 11. Valves to be a minimum of 20" in overall height to minimize contact between the liquid and the linkage and orifice areas.
 - a. Short body valves may be allowed where insufficient space is available, and as shown on the drawings.

- b. Short body valves to be a minimum of 11" in overall height.
- 12. Provide G.A. Industries Model 935-F sewage air and vacuum relief valve.

2.13 VALVE BOXES

- A. Provide at each buried valve.
- B. Cast iron extension type, suitable for minimum cover of 3'6" over the pipe.
- C. Minimum inside diameter at the top of 5", minimum wall thickness 3/16".
- D. Have the word "WATER"; "SEWER"; "SLUDGE", etc., as applicable, cast into the cover.
- E. Provide Tyler Series 6850.
- F. Where depth requires more than a two piece box use adjustable cast iron extensions.
- G. Coat box and cover with two (2) shop coats of bitumastic paint.

2.14 VALVE BOX PROTECTION RING

- A. Provide at each valve box a precast concrete protection ring.
- B. Provide two rings of No. 3 reinforcing steel, one 14" in diameter, and one 23" in diameter.
- C. Inside dimensions to be 9-1/4".
- D. Outside diameter to be 27".
- E. Provide 5" thickness at interior with a continuous slope to 2" thickness at the outside.
- F. Minimum weight of 110 lbs.

2.15 PRESSURE GAUGES

- A. Provide pressure gauges where indicated on the drawings and not otherwise specified in separate sections of these Specifications.
 - 1. Provide solid front rounded type, 4 or 4-1/2" phenolic or stainless steel case with blow-out back, Type 316 stainless steel bourdon tube, glycerin fill, 1/2" NPT bottom male threaded connection, Teflon coated 400 series, stainless steel rotary movement, black micro-adjusted corners and black figures with white plastic dials, and a threaded ring.
 - 2. Provide gauge accurate to within 1/2% of the total scale range.
 - 3. Provide glycerin filled diaphragm isolators on all gauges except for those used on potable water systems.
 - a. Provide diaphragm material resistant to chemicals in the process line being measured.
 - b. Type 316L stainless steel housing and components.
 - c. 1/2" connection.
 - d. Provide fill/bleed connection.
 - e. Viton o-rings with Teflon back-up ring.

4. Select gauge at the range indicated on the drawings or at the nearest standard range which provides a top limit above the pump shutoff head at the operating conditions but no greater than 10% above the shut off head.
5. Each gauge connection to consist of a shutoff valve and 1/2" stainless steel piping connections.
 - a. Shutoff valve to be Type 316 stainless steel ball valve with T-handle operator.
6. Provide gauges manufactured by Ametek, Ashcroft, McDaniel or Wika.

2.16 MANHOLES

- A. Comply with Section 02722, Sewers: Sanitary, Gravity.

2.22 CLEANOUTS

- A. Comply with Section 02722, Sewers: Sanitary, Gravity.

2.23 MISCELLANEOUS PARTS AND ACCESSORIES

- A. Use standard commercial grade suitable for the type of installation or system involved, and conforming to the applicable standards and specifications of the AWWA and approved by the Engineer.

PART 3 - EXECUTION

3.1 HANDLING

- A. Handle pipe accessories so as to ensure delivery to the point of installation in sound, undamaged condition:
 1. Carry pipe into position - do not drag.
 2. Use pinch bars or tongs for aligning or turning the pipe only on the bare end of the pipe.
 3. Use care not to injure pipe linings.
- B. Thoroughly clean interior of pipe and accessories before installation. Keep clean during installation operations by plugging or other method approved by the Engineer.
- C. Before installation, inspect each piece of pipe and each fitting for defects:
 1. Material found to be defective before or after installation: Replace with sound material meeting the specified requirements, and without additional cost to the Owner.
- D. Rubber gaskets: Store in a cool dark place until just prior to time of installation.

3.2 PIPE CUTTING

- A. Cut pipe neatly and without damage to the pipe.

- B. Unless otherwise recommended by the pipe manufacturer, and authorized by the Engineer, cut pipe with mechanical cutter only.
 - 1. Use wheel cutters when practicable for ductile iron pipe.
 - 2. Cut plastic pipe square, using handsaw, and remove all burrs.

3.3 LOCATING

- A. Where possible, locate water line at least 10' away, horizontally, from sewer pipes.
- B. Should 10' separation not be practical, then the water main may be located closer provided:
 - 1. It is laid in a separate trench.
 - 2. It is laid in the same trench with the water main located at one side on a bench of undisturbed earth.
 - 3. In either of the above cases, crown elevation of the sewer shall be at least 18" below invert elevation of water line.
- C. Where water lines cross over sewers, maintain 18" minimum clearance between crown of sewer and invert of water line.
- D. Where water lines cross under sewers, each line shall be cast iron or ductile iron.
 - 1. A full length of water line shall be located over the sewer so that joints will be equal distance from the sewer.
- E. No water pipe shall pass through or come in contact with any part of a sewer manhole.
- F. All piping shall be installed in strict accordance with 10 States Standards.

3.4 ALIGNMENT OF PIPE

- A. Pipe lines intended to be straight shall be so laid.
- B. Where vertical or horizontal alignment requires deflection from straight line or grade, such deflection shall not exceed maximum deflection recommended by the pipe manufacturer.
- C. If alignment requires deflection exceeding recommended limits, furnish special bends or a sufficient number of shorter lengths of pipe to provide angular deflections within the allowable limits.

3.5 PLACING AND LAYING

- A. General:
 - 1. Comply with pertinent OSHA regulations in regards to excavation of utilities.
 - 2. Excavation and backfilling to comply with pertinent provisions of Section 02221.
 - 3. Lower pipe and accessories into trench by means of derrick, ropes, belt slings, or other equipment approved by the Engineer.
 - 4. Do not dump or drop any of the materials of this Section into the trench.
 - 5. Except where necessary in making connections to other lines, lay pipe with the bells facing in the direction of laying.

6. Rest the full length of each section of pipe solidly on the pipe bed, with recesses excavated to accommodate bells, couplings, and joints.
 7. Take up and relay pipe that has the grade or joint disturbed after laying.
 8. Do not lay pipe in water, or when trench conditions are unsuitable for the work; keep water out of the trench until jointing is completed.
 9. Securely close open ends of pipe, fittings, and valves when work is not in progress.
 10. Where any part of coating or lining is damaged, repair to the approval of the Engineer and at no additional cost to the Owner.
- B. Ductile iron pipe:
1. Install all pipe, fittings and accessories in accordance with ANSI/AWWA C600.
 2. Gaskets: Handle, lubricate where necessary and install in strict accordance with manufacturer's recommendations.
- C. Flanged joints:
1. Provide true face flanges, field clean and fit with one full face gasket and make bolts up finger tight.
 2. Use torque wrench to alternately tighten bolts 180° apart until full gasket flow and seal are secured.
 3. Bias cut or unusual refacing of any flange will not be acceptable.
- D. Screw thread joints:
1. Make cuts square, with cuts thoroughly reamed and rough edges and burrs removed.
 2. Make threads sound, clean out, and well fitting.
 3. Use pipe dope on male fittings only.
 4. Make screwed joints tight with all necessary wrenches but without handle extensions.
- E. Solvent weld joints:
1. Install solvent weld joints in strict accordance with solvent cement manufacturer's instructions.
 2. Make cuts square, remove burrs from pipe ends and bevel slightly if necessary.
 3. Visually inspect inside of pipe, couplings and fittings removing all dirt and moisture with clean rag.
 4. Apply primer to surface of pipe and socket of fitting if required for cement being used, or lightly sandpaper surfaces.
 5. Apply solvent cement evenly and quickly around the outside of the pipe at a width slightly greater than depth of fitting socket.
 6. Apply a light coat of cement around the inside of the fitting socket.
 7. Quickly insert pipe into fitting socket bottom and give pipe or fitting a 90° turn to evenly distribute the cement, hold in place to prevent fitting rebound.
 8. Remove excess cement from pipe and fitting while cement is still soft.
 9. Allow joints to cure at least 24 hours before applying pressure to the piping system.
- F. Restrained joints:
1. Install in accordance with manufacturer's instructions.

2. Tighten set screws to the manufacturer's rated torque using a torque wrench. If twist-off nuts are provided, tighten screws until nut breaks loose.

3.6 INSTALLATION OF GRAVITY SANITARY SEWER PIPE

- A. Comply with Section 02722, Sewers: Sanitary, Gravity.

3.7 INSTALLATION OF EXPOSED PIPE

- A. All pipe shall be installed in accordance with details as shown on the Drawings and/or as directed by the Engineer.
- B. Installation and pipe routing details shall be provided by the Contractor.
- C. Pipe shall be run parallel with or at right angles to walls, equipment, ceilings, etc. Forty-five degree (45°) fittings, or angle runs shall be avoided as much as possible and installed only as approved by the Engineer.
- D. Modifications to piping installation based on actual field conditions may be required and shall receive the Engineer's approval. Changes will be provided by the Contractor at no additional cost to the Owner.

3.8 INSTALLATION OF STAINLESS STEEL PIPE AND FITTINGS

- A. Exercise extreme care to avoid contacting pipe with any ferrous materials.
- B. Use saws, drills, files, brushes, etc. that are specifically designated for use on stainless steel piping only.
- C. Use nylon slings or straps to handle piping.
- D. After installation, wash and rinse all foreign matter from the pipe. Remove manufacturer's identification marking with paint thinner or solvent.
- E. Provide final cleaning with detergent and hot water and rinse clean.
- F. Threaded pipe:
 1. Thread cut pipe utilizing dies specifically for stainless steel pipe.
 2. Remove all debris and grit and solvent clean cut threads.
 3. Apply joint compound to completely fill all voids.
 4. Clean excessive joint compound from piping after completing joint.

3.9 LINK SEAL SLEEVE SEAL

- A. Install seal between piping and sleeve.
- B. Tighten bolts to manufacturer's specified torques.
- C. Check for leaks.
- D. Install escutcheon plate at exposed locations.

3.10 ADAPTER FLANGE COUPLING

- A. End of pipe not to exceed 1/4" from mating flange.
- B. Apply "Never-Seize" to stainless steel set screws.
- C. Tighten set screws to manufacturer's recommendations using a torque wrench.

3.11 THRUST BLOCKS

- A. General:
 - 1. Provide thrust blocks, or metal tie rods and clamps or lugs, on plugs, caps, tees, hydrants and bends deflecting 11-1/4° or more either vertically or horizontally.
 - 2. Provide concrete thrust blocking with a compressive strength of 3000 psi in 28 days.
 - 3. Size of the blocking will be determined by the Engineer, based on soil bearing capacity.
 - 4. Thrust blocking is not required on restrained joint fittings.
 - 5. Provide 8 mil. polyethylene film between the thrust block and fittings.
- B. Installation:
 - 1. Locate thrust blocking between solid ground and the fitting to be anchored.
 - 2. Unless otherwise shown or directed by the Engineer, place the base and thrust bearing sides of thrust blocking directly against undisturbed earth.
 - 3. Sides of thrust blocking not subject to thrust may be placed against forms.
 - 4. Place thrust blocking so the fitting joints will be accessible for repair.
 - 5. Protect steel rods and clamps by galvanizing or by coating with bituminous paint.

3.12 SETTING VALVE BOXES

- A. Center valve boxes on the valves, setting plumb.
- B. Tamp earth fill around each valve box to a distance of 4' on all sides, or to the undisturbed trench face if less than 4'.
- C. Fully open and close each valve to assure that all parts are in working condition.
- D. Place valve box protection ring around top of valve box as indicated on the plans.
 - 1. Install ring level with top 1" above finished grade.
 - 2. Top of ring to be level with or no more than 1" above the top of the valve box.
- E. Provide valve extension necessary to provide the operating nut within 2' of the top of the valve box.

3.13 INSTALLATION OF AIR RELEASE VALVES

- A. Compact backfill thoroughly over pressure sewer.
- B. Install gravel drainage bed or drain as shown on plans.

- C. Set valve plumb, using Schedule 40, stainless steel pipe between pressure sewer and valve.

3.14 MANHOLES

- A. Comply with Section 02722, Sewers: Sanitary, Gravity.

3.15 CLEANOUTS

- A. Comply with Section 02722, Sewers: Sanitary, Gravity.

3.16 PIPE HANGERS AND SUPPORTS

- A. Install in accordance with manufacturer's recommendations using stainless steel anchors.
- B. Install plumb.

3.17 HYDROSTATIC TESTING - PRESSURE LINES

A. General:

1. Pressure and leakage testing must be conducted in accordance with AWWA Standards C600.
2. Clean and flush line of air, dirt and foreign material.
3. Do not perform hydrostatic tests until at least five days after installation of concrete thrust blocking.
4. Test pump, pipe connection, pressure gauges, measuring devices and all other necessary appurtenances to conduct tests are to be provided by the Contractor.
5. Install brass corporation cocks at all high points that do not have permanent air vents. Corporation cocks are to be left in place and all costs for providing such cocks are to be borne by the Contractor.
6. Conduct tests on each line or valved section of line.
7. Test pressures to be 150 psi, or 1.5 times the maximum working pressure, whichever is greater, based on the elevation of the lowest point of the section under test and corrected to the elevation of the test gauge.
8. Do not test pipe at pressures exceeding manufacturer's recommendations.
9. The Contractor must provide documentation of the pressure and leakage tests. Documentation must include length of lines, diameter of pipe(s), amount of water required to fill line after test was performed, and amount of allowable leakage.
10. The witness to the hydrostatic testing is to be someone other than the Contractor or the utility installing the lines.

B. Pressure tests:

1. After the pipe is laid, the joints completed, and the trench backfilled, subject the newly laid piping and valved sections of the piping to the test pressure specified in Part A above.
2. Open and close each valve within the section being tested several times during the test period.
3. Replace or remake joints showing leakage.

- a. Remove cracked pipe, defective pipe, and cracked or defective joints, fittings and valves. Replace with sound material and repeat the test until results are satisfactory.
- b. Make repair and replacement without additional cost to the Owner.

C. Leakage test:

- 1. Conduct leakage test after the pressure test has been completed satisfactorily.
- 2. Duration of each leakage test: At least two hours.
- 3. During the test, subject water lines to the test pressure specified in Part A above.
- 4. Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved or approved section thereof, necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled.
 - a. No piping installation will be accepted until the leakage is less than the number of gallons per hour as determined by the formula(s):
 - 1) Ductile iron piping:

$$L = S \times D \times \sqrt{P} / 133,200; \text{ where}$$

L = allowable leakage in gallons per hour;
 S = length of pipe tested in feet;
 D = nominal diameter of pipe in inches; and
 P = average test pressure psi gauge.

- b. When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gallons per hour per inch of nominal valve size will be allowed.
 - 1) Should any test of pipe disclose leakage greater than that specified above, locate and repair the defective joint or joints until the leakage is within the specified allowance, and at no additional cost to the Owner.
 - 2) Repair all visible leaks regardless of test results.

3.18 PAINTING

- A. Paint all exposed piping and hydrants complying with pertinent provisions of Section 09900.

3.19 MEASUREMENT AND PAYMENT

- A. No separate measurement or direct payment will be made for the items under this Section and all costs for same shall be included in the price bid for the project.

END OF SECTION

SECTION 02780
CASING PIPES FOR UTILITIES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide and install casing pipes or tunnels under surface structures, where indicated, as specified herein, and as needed for a complete and proper installation.
- B. Related work: Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Use equipment adequate in size, capacity, and numbers to accomplish the work in a timely manner.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 15 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01640.

PART 2 - PRODUCTS

2.1 CASING PIPE FOR DRY BORES

- A. Steel complying with ASTM A 139 for Grade B with minimum yield strength of 35,000 psi.
- B. Provide ends suitable for field welding.

- C. Minimum wall thickness as follows:

<u>Diameter of Casing (Inches)</u>	<u>Minimum Wall Thickness (Inches)</u>
6 thru 14	1/4
16 and 18	5/16
20 and 22	3/8
24 and 26	7/16
28 thru 32	1/2

2.2 PIPELINE CASING SPACERS

- A. For piping installed in casing provide pipeline casing spacers.
- B. Provide a minimum of 1 spacer per ten linear feet of pipe for ductile iron pipe and a minimum of 1 spacer per six linear feet for PVC pipe.
- C. Provide spacer with shell of 14 gauge T-304 stainless steel.
- D. Provide shell liner of .090" thick PVC, 85-90 durometer.
- E. Provide 5/16" stainless steel connecting bolts and lock nuts, minimum three (3) per flange.
- F. Runners from 2" wide ultra high molecular weight polymer with a high resistance to abrasion and a coefficient of friction of 0.11 -0.13 in accordance with ASTM D 1894.
- G. Support runners on 14 gauge reinforced T-304 stainless steel risers welded to shell.
- H. All metal surfaces to be fully passivated.
- I. The diameter as measured over the runners shall exceed the pipeline bell or coupling outside diameter.
- J. Provide pipeline casing spacers as manufactured by Cascade Manufacturing, Pipeline Seal and Insulator, Inc. or approved equal.

PART 3 - EXECUTION

3.1 ENTRY PITS

- A. Locate to avoid interference with traffic, adjacent structures, etc., to such extent possible.
- B. Excavate to required depth, providing sheeting and shoring necessary for protection of the Work and for safety of personnel.
- C. Maintain in dry condition by use of pumps, drains or other approved method.

- D. Provide concrete barricades around each entry pit to secure pit and provide safety from adjacent travel lanes. Provide barricades on side adjacent to the existing roadway and perpendicular to the lanes of travel.

3.2 INSTALLATION

- A. Install casings by dry-boring through the casing while simultaneously jacking the casing.
- B. Any proposed alternate method shall be approved in writing by the Engineer.
- C. Weld joints to provide a watertight joint.
- D. Casings for gravity sanitary sewer, storm drainage, or water lines to be installed to grade, shall not vary more than 3/32" per foot of length from the indicated grade.
 - 1. Remove and replace any improperly installed or otherwise defective casing at no additional cost to the Owner.

3.3 INSTALLING PIPE IN CASING

- A. General:
 - 1. Inspect carefully, insuring that all foreign material is removed from the casing and the casing meets alignment criteria for the type of carrier pipe being used.
 - 2. For pressure systems, the casing deflection shall not exceed the maximum deflection recommended by the carrier pipe.
 - 3. Install casing spacers on the carrier pipe per the manufacturer's instructions.
 - 4. For sanitary and storm sewer provide spacer sizing and length necessary to obtain the pipe slope and elevations as shown on the plans.
 - 5. Provide centered or restrained configuration.
 - 6. Install the carrier pipe in the casing ensuring each joint is pushed "home" before the joint is installed into the casing.

3.4 CASING ENDS

- A. Seal each end with brick and mortar to prevent entrance of foreign material.

END OF SECTION

SECTION 02930

GRASSING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide grassing of the areas specified herein, or as indicated, for a complete and proper installation.
 - 1. Pump station sites: All cleared areas and areas disturbed by the construction operation.
 - 2. Water and sanitary sewer easements, including highway and street shoulders: All areas disturbed by the construction operation.
- B. Temporary Seeding (TS), Mulching (M), Erosion Control Blankets (ECB) and Permanent Seeding (PS) for erosion and sediment control shall conform to the South Carolina Department of Health and Environmental Control (SC DHEC), Storm Water Management, BMP Handbook, dated August 2005, and the BMP Field Manual, dated July 2005.
 - 1. Temporary Seeding (TS), BMP Handbook, Pages 8 thru 10, and Appendix C, and BMP Field Manual, Pages 1-7 thru 1-11 and Appendix C from the BMP Handbook;
 - 2. Mulching (M), BMP Handbook, Pages 11 and 12, and BMP Field Manual, Pages 1-12 thru 1-14;
 - 3. Erosion Control Blankets (ECB), BMP Handbook, Pages 13 thru 16, and BMP Field Manual, Pages 1-15 thru 1-18;
 - 4. Turf Reinforcement Mats (TRM), BMP Handbook, Pages 17 thru 20, and BMP Field Manual, Pages 1-19 thru 1-22;
 - 5. Bonded Fiber Matrix (BFM), BMP Handbook, Pages 23 and 24, and BMP Field Manual, Pages 1-25 thru 1-28; and,
 - 6. Permanent Seeding (PS), BMP Handbook, Pages 25 thru 27, and BMP Field Manual, Pages 1-29 thru 1-33.
- C. Wetlands seeding shall conform to the US Army Corps of Engineers Permit issued for the project and the seed mix shown on the drawings.
- D. For projects requiring grass seed for full or partial shady areas the contractor shall coordinate the seed selection with the Engineer prior to grassing. All lawns disturbed by construction activity related to the project shall be restored to the satisfaction of the property owner with the specific type of grassing, shrubs, trees, etc. Contractor shall provide engineer with a letter of satisfaction endorsed by the property owner.
- C. Related work: Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Seed: Conform to all State laws and to all requirements and regulations of the South Carolina Department of Agriculture.
 - 1. Deliver to site each variety of seed individually packaged and tagged to show name, net weight, origin and lot number.
- C. Fertilizer: Conform to State fertilizer law.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Complete materials list of items proposed to be provided under this Section.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01640.
- B. At time of delivery, furnish the Engineer invoices of all materials received in order that application rates may be determined.
- C. Immediately remove from the site materials that do not comply with the specified requirements, and promptly replace with materials meeting the specified requirements.

PART 2 - PRODUCTS

2.1 FERTILIZER

- A. Provide commercial balanced 16-4-12 or 12-4-8 fertilizer delivered to the site in bags labeled with the manufacturer's guaranteed analysis.

2.2 GRASS SEED

- A. Provide grass seed that is:
 - 1. Free from noxious weed seeds, and recleaned.
 - 2. Grade A recent crop seed.
 - 3. Treated with appropriate fungicide at time of mixing.
 - 4. Delivered to the site in sealed containers with dealer's guaranteed analysis.

2.3 LIME

- A. Provide agricultural grade, standard ground limestone conforming to current "Rules, Regulations and Standards of the Fertilizer Board of Control" issued at Clemson University.
- B. Bag tags or delivery slip for bulk loads shall indicate brand or trade name, calcium carbonate equivalent, and other pertinent data to identify the lime.

2.4 WOOD CELLULOSE FIBER

- A. Provide wood chip particles manufactured particularly for discharging uniformly on the ground surface when dispersed by a hydraulic water sprayer.
- B. Material to be heat processed so as to contain no germination or growth inhibiting factors.
- C. It shall be dyed (non-toxic) an appropriate color to facilitate metering.

2.5 STRAW MULCH

- A. Provide straw or hay material.
 - 1. Straw to be stalks of wheat, rye, barley or oats.
 - 2. Hay to be timothy, peavine, alfalfa, or coastal bermuda.
- B. Material to be reasonably dry and reasonably free from mature seed bearing stalks, roots, or bulblets or Johnson Grass, Nutgrass, Wild Onion and other noxious weeds.
- C. *Comply with all State and Federal domestic plant quarantine regulations.*

2.6 EXCELSIOR FIBER MULCH

- A. To consist of 4" to 6", average length, wood fibers cut from sound, green timber.
- B. Make cut in such a manner as to provide maximum strength of fiber, but at a slight angle to natural grain of the wood.

2.7 EROSION CONTROL BLANKET, (ECB)

- A. Provide on areas as shown on the plans.
- B. The erosion control blanket (ECB) must be SC DHEC BMP Handbook, Class A for slope application or Class B for channel application, and conform to the SC DOT Standard Specifications for Highway Construction (SSHC) 815.04 and must be listed on the SC DOT Material Approval Sheet No. 55.
- C. Provide Erosion Control Blanket S150, from North American Green, or approved equal.

2.8 TURF REINFORCEMENT MAT, (TRM)

- A. Provide on areas shown on the plans.
- B. The turf reinforcement mat (TRM) must conform to the SC DOT Supplemental Specification for Rolled Erosion Control Products (RECP) Specifications dated February 14, 2005 and must be listed on the SC DOT Material Approval Sheet No. 56.

2.9 BONDED FIBER MATRIX, (BFM)

- A. Provide on areas shown on the plans.
- B. The bonded fiber matrix (BFM) must conform to the SC DOT Supplemental Specification for Bonded Fiber Matrix (BFM) dated July 21, 2004 and must be listed on the SC DOT Material Approval Sheet No. 65.

PART 3 - EXECUTION

3.1 GENERAL

- A. Seed these areas immediately upon completion of grading or construction and clean-up operations.
 - 1. Slopes greater than four horizontal to one vertical.
 - 2. Utility rights-of-way adjacent to stream banks.
- B. Areas ready for planting between August 16 and February 28 shall be planted with a temporary cover of Schedule No. 2. At the acceptable seasons for planting Schedule No. 1, the turf shall be destroyed by reworking the soil, and Schedule No. 1 seeding established as specified herein.
- C. Use Rate A lbs. per 1000 sq. ft. on slopes over 5' horizontal to 1' vertical in height and use Rate B lbs. per 1000 sq. ft. on slopes less than 5' horizontal to 1' vertical.

3.2 SEEDING SCHEDULES

- A. Mixtures of different types of seed for the various schedules shall be weighed and mixed in proper proportions in the presence of the Engineer.
- B. Schedule No. 1 - Planting dates March 1 to August 15:

Common Name of Seed	Rate A	Rate B
Rye Grain	1	1
Common Bermuda (hulled)	0	1.5
Sericea Lespedeza (clay soils)	1	0
Weeping Love Grass (sandy soils)	1	0
Centipede	0.5	0.5

C. Schedule No. 2 - Planting dates August 16 - February 28:

Common Name of Seed	Rate A	Rate B
Rye Grain	0	1
Common Bermuda (hulled)	0	1.5
Brown Top Millet	5	0
Common Bermuda (unhulled)	0	2.0

3.3 GROUND PREPARATION

- A. Bring all areas to proper line, grade and cross section indicated on the plans.
- B. Repair erosion damage prior to commencing seeding operations.
- D. Loosen seed bed to minimum depth of 4 to 6".
- D. Remove all roots, clods, stones larger than 1" in any dimension, and other debris.
- E. Conduct soil test to determine pH factor.
 - 1. If pH is not in the range of 6.0 to 6.5, adjust.
 - 2. For temporary seeding (TS), where a soil test is not taken, apply lime at a minimum of 1.50 tons / acre (70 lbs. / 1000 SF).
 - 3. Mix with soil to a depth of approximately 4 to 6".

3.4 APPLICATION OF FERTILIZER

- A. Spread uniformly over areas to be seeded at:
 - 1. Rate of 18 lbs. per 1000 sq. ft. when using 16-4-12.
 - 2. Rate of 25 lbs. per 1000 sq. ft. when using 12-4-8.
 - 3. Use approved mechanical spreaders.
 - 4. For temporary seeding (TS), provide 500 lbs / acre (11.5 lbs. / 1000 SF), when using 10-10-10.
- B. Mix with soil to depth of approximately 4 to 6".

3.5 SOWING METHODS

- A. General:
 - 1. Perform seeding during the periods and at the rates specified in the seeding schedules.
 - 2. Do not conduct seeding work when ground is frozen or excessively wet.

3. Produce satisfactory stand of grass regardless of period of the year the Work is performed.
- B. Seeding, slopes less than four horizontal to one vertical:
1. Shall conform to Methods EA, WF or WCF as specified hereinafter.
 2. Method EA (Emulsified Asphalt):
 - a. Sow seed not more than 24 hours after application of fertilizer.
 - b. Use mechanical seed drills on accessible areas, rotary hand seeders, power sprayers, etc. may be used on steep slopes or areas not accessible to seed drills.
 - c. Cover seed and lightly compact with cultipacker if seed drill does not.
 - d. Within 24 hours following compaction of seeded areas, uniformly apply 0.2 gallons per square yard of emulsified asphalt over the seeded area.
 3. Method WF:
 - a. Sow seed as specified for Method EA.
 - b. Within 24 hours following covering of seeds, uniformly apply excelsior fiber at the rate of 100 lbs. per 1000 sq. ft.
 - c. Apply material hydraulically.
 - d. Seeded areas to be lightly rolled to form a tight mat of the excelsior fibers.
 4. Method WCF:
 - a. Apply seed, fertilizer and wood fiber mulch using hydraulic equipment.
 - b. Equipment to have built-in agitation system with capacity to agitate, suspend and homogeneously mix a slurry of the specified amount of fiber, fertilizer, seed and water.
 - c. Minimum capacity of slurry tank: 1000 gallons.
 - d. Apply fiber mulch at rate of 35 lbs. per 1000 sq. ft.
 - e. Regulate slurry mixture so that amounts and rates of application will result in uniform application of all materials at not less than the specified amounts.
 - f. Apply slurry in a sweeping motion, in an arched stream, so as to fall like rain, allowing the wood fibers to build upon each other.
 - g. Use color of wood pulp as guide, spraying the prepared seed bed until a uniform visible coat is obtained.
- C. Seeding, slopes greater than four horizontal to one vertical:
1. Sow seed as specified for Method EA, unmulched.
 2. Cover seeded area with erosion control blanket (ECB) to maximum slope of 2H:1V or flatter.
 3. Cover seeded area with turf reinforcement mat (TRM) greater than 2H:1V to 1H:1V (Type 3) or greater (Type 4).
 4. Cover seeded area with bonded fiber matrix (BFM) greater than 2H:1V to 1H:1V.
- D. Straw Mulching:

1. If straw mulching is used, apply at a rate of 1.5 to 2.0 tons / acre (90 lbs. / 1000 SF).

3.6 SECOND APPLICATION OF FERTILIZER

- A. When plants are established and showing satisfactory growth, apply nitrogen at the rate of 1.0 lb. per 1000 sq. ft.
- B. Apply in dry form unless otherwise directed by the Engineer.
- C. Does not apply to stands of temporary grasses.

3.7 MAINTENANCE

- A. Maintain all seeded areas in satisfactory condition until final acceptance of the Work.
- B. Areas not showing satisfactory evidence of germination within six weeks of the seeding date shall be immediately reseeded, fertilized and/or mulched.
- C. Repair any eroded areas.
- D. Mow as necessary to maintain healthy growth rate until final acceptance of the Work.
- E. Irrigate seeded areas if normal rainfall is not adequate.

3.8 ACCEPTANCE

- A. Permanently seeded areas (Schedule No. 1) will be accepted when the grass attains a height of 2" and full coverage.
- B. No acceptance will be made of temporary seeded areas (Schedule No. 2). Rework and seed with Schedule No. 1.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide cast-in-place concrete, including formwork and reinforcement, for thrust blocking or protection concrete where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Reference standards: Comply with the following codes, specifications and standards, except as otherwise shown or specified:
 - 1. American Concrete Institute
 - 2. American Society for Testing and Materials (ASTM)
 - 3. Concrete Reinforcing Steel Institute (CRSI):
- C. Testing agency: A testing laboratory will be retained by the Owner to perform material evaluation tests required by these specifications.
- D. Plant qualification: Plant equipment and facilities shall meet all requirements of the Check List for Certification of Ready Mixed Concrete Production Facilities of the National Ready Mixed Concrete Association and ASTM C94.

1.3 SUBMITTALS

- A. Comply with the pertinent provisions of Section 01340.
- B. Within 15 calendar days after receiving the Owner's Notice to Proceed, submit proposed mix designs for approval.
 - 1. Proportions shall be determined by means of laboratory tests of concrete made with the cement and aggregate proposed for use.
 - 2. Provide report in detail from an approved testing laboratory showing 7-day and 28-day strengths obtained using materials proposed.

- C. Shop drawings: Submit the following shop drawings to the Engineer for approval before work is started.
 - 1. Reinforcing steel drawings: Prepare in accordance with ACI 315. Indicate bending diagrams, assembly diagrams, splicing and laps of bars, dimensions and details of bar reinforcing and accessories.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01640.
- B. Store reinforcement in a manner that will avoid excessive rusting or coating by grease, oil, dirt and other objectionable materials.
- C. Keep reinforcement in separate piles or racks so as to avoid loss of identification after bundles are broken.

PART 2 - PRODUCTS

2.1 FORMS

- A. Use form materials conforming to ACI 347.
- B. Form lumber: Use lumber of sufficient quality and grade, size and stiffness to adequately support the work and insure dimensional accuracy.
- C. Form ties: Use form ties which do not leave an open hole through the concrete and which permit neat and solid patching at every hole.
- D. Form coatings: Form release coating shall be neat oil with surface wetting agent or chemical release agent which effectively prevents absorption of moisture, prevents bonding with concrete, is non-staining to concrete and leaves the concrete with a paintable surface.
- E. Chamfer strips: Chamfer strips shall be wood or polyvinyl strips or approved equal, designed to be nailed in the forms to provide a $\frac{3}{4}$ " chamfer (unless indicated otherwise) at all exposed edges and corners of concrete members.

2.2 REINFORCEMENT

- A. Comply with the following as minimums:
 - 1. Bars: ASTM A615, Grade 60, unless otherwise shown on the Drawings, using deformed bars for Number 3 and larger.
 - 2. Welded wire fabric: ASTM A185.
 - a. Use sheet (mat) welded wire fabric only.
 - b. Welded wire fabric supplied in rolls will not be accepted.
 - 3. Bending: ACI 315 and ACI 318.

- B. Fabricate reinforcement to the required shapes and dimensions, within fabrication tolerances stated in the CRSI "Manual of Standard Practices".
- C. Do not use reinforcement having any of the following defects:
1. Bar lengths, depths, or bends exceeding the specified fabricating tolerances.
 2. Bends or kinks not indicated on the Drawings or required for this Work.
 3. Bars with excessive rust, scale, dirt, oil or other defects which will reduce the bond or the effective cross section of the bar.
- D. Furnish all support bars, tie bars, chairs, bolsters, etc. required for properly supporting and spacing bars in the forms.
1. For slabs on grade, use supports with stand plates or horizontal runners where wetted base materials will not support chair legs. Other supports must be approved by the Engineer.
 2. Supply supports for welded wire fabric as follows:
- Welded Wire Fabric Support Spacing
- | Welded Wire
Reinforcement
(diameter) | Welded Wire
Spacing
(inches) | Maximum Support
Spacing
(feet) |
|--------------------------------------------|------------------------------------|--------------------------------------|
| W9 or larger | 12 and greater | 4 |
| W5 to W8 | 12 and greater | 3 |
| W9 and larger | Less than 12 | 3 |
| W4 to W8 | Less than 12 | 2 |
| Less than W4 | Less than 12 | 1.5 |
- E. Tie wire: FS QQ-W-461, annealed steel, black, 16-gauge minimum.
- F. Splice devices: Shall be sized to develop one hundred twenty-five (125%) percent of yield strength of bar.

2.3 CONCRETE MATERIALS

- A. Cement: Use portland cement: ASTM C150, Type I, Type I-P or Type II, low alkali.
1. Where concrete will be exposed to sewage, use Type II or I-P cement.
 2. Fly ash shall conform to ASTM C618, Class C or F.
 3. Fly ash content shall not exceed 20% by weight of the total amount of cementitious materials (portland cement plus fly ash).
- B. Aggregates:
1. Fine aggregate: Conform to ASTM C33.
 2. Coarse aggregate: Conform to ASTM C33, Size #57.

- C. Water: Clean and potable and free from injurious amounts of deleterious materials.
- D. Admixtures:
 - 1. Air entraining admixture: ASTM C260.
 - 2. Water reducing, set controlling admixture: Conform to ASTM C494.
 - a. Type A - water reducing.
 - b. Type D - water reducing and retarding.
 - 3. Do not use admixtures containing calcium chloride.
- E. Curing compounds:
 - 1. On all vertical and formed surfaces, construction joints, basin slabs, surfaces to receive an applied coating or finish, and other surfaces except as otherwise indicated or specified, use a non-residual, non-staining curing compound conforming to ASTM C309 Type 1 and 1D. Acceptable products are:
 - a. L&M Cure by L&M Construction Chemicals, Inc.
 - b. Horn WB-75 by A.C. Horn Company.
 - c. Sonosil by Sonneborn, Inc.
 - d. Approved equal.

2.4 CONCRETE MIXES

- A. Provide concrete with the compressive strengths shown on the Drawings. When such strengths are not shown on the Drawings, provide the following 28-day strengths as minimum:

All structural concrete:	4000 psi
All thrust blocking, sidewalks, curbs and gutters, and unreinforced foundations:	3000 psi
Backfill or encasement for piping, and concrete fill:	2500 psi
- B. Maximum water cement ratios:

4000 psi concrete	0.5
3000 psi concrete	0.53
2500 psi concrete	0.67
- C. Entrained air:

3000 and 4000 psi concrete	5% +/- 1%
2500 psi concrete	Not Required

D. Slump:

3000 and 4000 psi concrete	4" +/- 1"
2500 psi concrete	5" +/- 1"

E. Production of concrete:

1. General: Concrete shall be ready mixed and shall be batched, mixed and transported in accordance with ASTM C94 except as otherwise indicated.
2. Monitor time and mix proportions by plant delivery slips.
3. Air entraining admixtures: Add air entraining admixture into the mixture as a solution and measure by means of an approved mechanical dispensing device.
4. Water reducing and retarding admixture: Add water reducing and retarding admixture and measure as recommended by the manufacturer.
5. Addition of water to the mix upon arrival at the job site shall not exceed that necessary to compensate for a 1" loss in slump, nor shall the design maximum water-cement ratio be exceeded. Water shall not be added to the batch at any later time.
6. Weather conditions: Control temperature of mix as required by ACI 306 "Cold Weather Concreting" and by ACI 305 "Hot Weather Concreting".

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Water, mud, organic, and other detrimental material shall be removed from excavations before concrete is deposited.
- C. Notify the Engineer prior to placing concrete and place no concrete until the formwork, reinforcing and embedded items have been inspected by the Engineer.

3.2 FORMWORK

A. General:

1. Construct forms in conformance with ACI 347.
2. Design, erect, support, brace and maintain formwork so it will safely support vertical and lateral loads which might be applied until such loads can be supported safely by the concrete structure.
3. Construct forms to the exact sizes, shapes, lines and dimensions shown, and as required to obtain accurate alignment, location, grades, level and plumb work in the finished structure.
4. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints and provide backup material at joints as required to prevent leakage and prevent fins.

- B. Formwork reuse: Reuse only forms that are in good condition and which maintain a uniform surface texture on exposed concrete surfaces.
- C. Removal of forms:
 - 1. Do not disturb or remove forms until the concrete has hardened sufficiently to permit form removal with complete safety. Do not remove shoring until the member has acquired sufficient strength to support its own weight, the load upon it, and the added load of construction.
 - 2. When reshoring or backshoring is permitted or required, plan the operations in advance and submit procedures to the Engineer for approval.
 - a. Design and plan all reshoring operations to support all construction loading and in accordance with ACI 347.
 - 3. Exercise care in removing forms from finished concrete surfaces so that surfaces are not marred or gouged and that corners are true, sharp and unbroken.

3.3 EMBEDDED ITEMS

- A. Embedded items: Set anchor bolts and other embedded items accurately and securely in position in the forms until the concrete is placed and set.
- B. Piping cast in concrete:
 - 1. Install and secure sleeves, wall pipes and pipe penetrations before placing concrete.
 - 2. Do not weld or otherwise attach piping to reinforcing steel.
 - 3. Support piping to be encased in concrete securely and on firm foundation so as to prevent movement or settlement during concreting.
- C. Locate electrical conduit so that it will not impair the strength of the construction.

3.4 REINFORCEMENT

- A. General: Comply with the specified codes and standards and Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars" for details and methods of reinforcement placement and supports and as herein specified.
 - 1. Clean reinforcement and remove loose dust and mill scale, earth, and other materials which reduce or destroy bond with concrete.
 - 2. Position and secure reinforcement against displacement by forms, construction, and the concrete placement operations.
 - 3. Use adequate number of ties to secure reinforcing.
 - 4. Do not weld or field bend reinforcing without prior approval by the Engineer.
- B. Placing reinforcing:
 - 1. Provide and install all chairs, runners, bolsters, standees and other accessories in sufficient quantities to satisfactorily position the reinforcing and hold it in place during concrete placement.

2. Support reinforcing for slabs on ground on chairs or bolsters with stand plates or a properly sized concrete cube.
 - a. Use concrete bricks as supports only as approved by the Engineer.
 3. Secure and tie dowels in place prior to placing concrete. Do not press dowels into wet concrete.
- C. Concrete cover: Unless otherwise indicated on the drawings or specified herein, install reinforcing with clear concrete coverage in conformance with ACI 318.
1. All reinforcement, regardless of size, exposed to water or sewage shall have 2" cover.
 2. Place reinforcement a minimum of 2" clear of any openings, metal pipe, or fittings.
- D. Splicing reinforcement: Splice reinforcement steel in accordance with the latest revisions of ACI 318 "Building Code Requirements for Reinforced Concrete" unless shown otherwise on the drawings.
- E. Welded wire mesh: Install welded wire fabric in as long of a length as practicable and lay flat before placing concrete.

3.5 PLACING CONCRETE

A. Preparation:

1. Remove foreign matter accumulated in the forms.
2. Rigidly close openings left in the formwork.
3. Wet wood forms sufficiently to tighten up cracks. Wet other material sufficiently to maintain workability of the concrete.
4. Use only clean tools.
5. Provide and maintain sufficient tools and equipment on hand to facilitate uninterrupted placement of the concrete.
6. Before commencing concrete, inspect and complete installation of formwork, reinforcing steel and all items to be embedded or cast-in.

B. Conveying:

1. Transport and handle concrete from the truck to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of ingredients to maintain the quality of the concrete.
2. Do not use concrete that is not placed within 1 ½ hours after water is first introduced into the mix unless the slump is such that it meets the specified limits without the addition of water to the batch.

C. Placing:

1. Deposit concrete as nearly as practicable in its final location so as to avoid separation due to rehandling and flowing.
2. Deposit concrete in horizontal layers not deeper than 2', avoiding inclined layers.
3. Place concrete at such a manner that concrete upon which fresh concrete is deposited is still plastic.

- D. Hot weather placement: Place concrete in hot weather in accordance with ACI 305 "Hot Weather Concreting".
 - 1. Do not place concrete whose temperature exceeds 100⁰ F.
- E. Cold weather placement: Place concrete in cold weather in accordance with ACI 306.
 - 1. Except when authorized specifically by the Engineer, do not place concrete when the atmospheric temperature is below 40⁰ F.
- F. Consolidation:
 - 1. Consolidate each layer of concrete immediately after placing, by use of internal concrete vibrators supplemented by hand spading, rodding, or tamping.
 - 2. Do not vibrate forms or reinforcement.
 - 3. Do not use vibrators to transport concrete inside the forms.

3.6 PROTECTION

- A. Protect the surface finish of newly placed concrete from damage by rainwater or construction traffic.
- B. Do not apply design loads to structures until the concrete has obtained the specified strength.
 - 1. Do not backfill against walls until they have reached the specified strength and all supporting or bracing walls, slabs, etc. have also reached the specified strength, unless otherwise permitted by the Engineer.
 - 2. Protect structures from construction overloads.

3.7 CURING

- A. Beginning immediately after placement, protect concrete from premature drying, excessively hot and cold temperatures and mechanical injury.
- B. Continuously cure concrete for a period of not less than 7 days after placement.
- C. Unless otherwise directed by the Engineer, cure concrete not in contact with forms in accordance with one of the following procedures:
 - 1. Ponding or sprinkling: Keep entire concrete surface wet by continuously sprinkling or by allowing water to pond, covering all surfaces.
 - 2. Wet burlap: Thoroughly wet and cover all concrete surfaces with wet burlap mats as soon as the concrete has set sufficiently to avoid marring the surface.
 - a. Keep the burlap continuously wet during the curing period.
 - 3. Curing blankets: Thoroughly wet concrete surfaces to be cured and cover with curing blankets as soon as the concrete has set sufficiently to avoid marring the surface.
 - a. Weight the blankets down to maintain close contact with the concrete surface.

- b. Use sheets of waterproof kraft paper with the joints between sheets taped continuously; or
- c. Use sheets of 4 mil or thicker polyethylene with the joints between sheets continuously taped.
- 4. Wet sand: Apply a layer of sand over the entire surface and keep it continuously wet.

3.8 SURFACE REPAIR

A. Patching mortar:

- 1. Make a patching mortar consisting of 1 part portland cement to 2 ½ parts sand by damp loose volume.
- 2. Mix the mortar using one part acrylic bonding admixture to two parts water.

B. Tie holes: Clean and dampen all tie holes and fill solidly with patching mortar.

C. Surface defects:

- 1. Remove all defective concrete down to sound solid concrete.
- 2. Chip edges perpendicular to the concrete surface or slightly undercut, allowing no feathered edges.
- 3. Dampen surfaces to be patched.
- 4. Patch defects by filling solidly with repair mortar.

D. Allow the Engineer to inspect the work before placing the patching mortar.

E. Repair defective areas greater than 1 sq. ft. or deeper than 1 ½" as directed by the Engineer using materials approved by the Engineer at no additional expense to the Owner.

3.9 FIELD QUALITY CONTROL

A. Concrete cylinder tests:

- 1. During construction, prepare test cylinders for compressive strength testing, using 6" diameter by 12" long single use molds, complying with ASTM C31.
 - a. Make a set of three test cylinders from each pour of 50 cubic yards or less, plus one additional set of cylinders for each additional 50 cubic yards or fraction thereof.
 - b. Identify each and tag cylinder as to date of pour and location of concrete which it represents.
 - c. Deliver cylinders to testing lab approved by the Owner.
 - d. Cost for preparation and delivery of cylinders shall be borne by the Contractor. Cost for testing cylinders will be borne by the Contractor.
- 2. Should strengths shown by test cylinders fail to meet specified strengths for the concrete represented, then:
 - a. Engineer shall have the right to require changes in the mix proportions as he deems necessary on the remainder of the work.
 - b. Additional curing of those portions of the structure represented by the failed

test cylinders shall be accomplished as directed by the Engineer.

- c. Upon failure of the additional curing to bring the concrete up to specified strength requirements, strengthening or replacement of those portions of the structure shall be as directed by the Engineer.
- d. The Engineer may require additional testing of concrete in question by either non-destructive methods such as the Swiss Hammer, Windsor Probe or Ultrasonics or by coring and testing the concrete in question in accordance with ASTM C42. Such testing shall be performed at no additional cost to the Owner.

B. Other field concrete tests:

- 1. Slump tests: Either the Engineer or a testing laboratory representative will make slump tests of concrete as it is discharged from the mixer.
 - a. Slump test may be made on any concrete batch at the discretion of the Engineer.
 - b. Failure to meet specified slump requirements (prior to addition of any superplasticizers) will be cause for rejection of the concrete.
- 2. Temperature: The concrete temperature may be checked at the discretion of the Engineer.
- 3. Entrained air: Air content of the concrete will be checked by a representative of the testing laboratory at the discretion of the Engineer.

C. Coordination of laboratory services: The Contractor shall be responsible for coordination of laboratory services.

- 1. Maintain a log recording quantities of each type of concrete placed, date and location of pour.
- 2. Inform the testing laboratory of locations and dates of concrete placement and other information as required to be identified in the laboratory's test reports.

D. Tests required because of extensive honeycombing, poor consolidation of the concrete or any suspected deficiency in the concrete will be paid for by the Contractor.

E. Concrete which fails to meet strength requirements, dimensional tolerances, watertightness criteria, or is otherwise deficient due to insufficient curing, improper consolidation or physical damage shall be replaced or repaired as instructed by the Engineer at no expense to the Owner.

3.10 MEASUREMENT AND PAYMENT

- A. No measurement or direct payment will be made for other work under this Section and all costs for same shall be included in the price bid for the item in which the concrete work is an integral part.

END OF SECTION

SECTION 03405

PRECAST UTILITY VAULT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide precast concrete utility vaults where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 03300 - Cast-in-Place Concrete.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Qualifications of manufacturer: Demonstrate capability to make and provide the specified quality products by attestation of the Prestressed Concrete Institute under the Plant Certification Program.
- C. Referenced manufacturer is Tindall Concrete Products, Inc. Equal precast vaults of other manufacturers conforming to these specifications may be provided with the Engineer's approval.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section.
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
 - 3. Manufacturer's certifications and laboratory test reports required.
 - 4. Shop drawings, prepared in accordance with pertinent provisions of Section 01340 of these Specifications and showing complete information for fabrication and erection of the work of this Section including, but not necessarily limited to:
 - a. Member dimensions and cross-sections; locations, size and type of reinforcement, including special reinforcement and lifting devices necessary for handling and erection.

- b. Erection procedures, sequence of erection, and required handling equipment.
- c. Layout, dimensions, and identification of each precast unit corresponding to the sequence and procedure of installation.
- d. Details of inserts, connections, and joints, including accessories and construction at openings in the precast units.
- e. Location and details of anchorage devices that are to be embedded in other construction.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01640.
- B. Delivery, storage and handling:
 - 1. Deliver the work of this Section to the job site in such quantities and at such times as to assure the continuity of construction.
 - 2. Store units at the job site in a manner to prevent cracking, distortion, warping, staining and other physical damage, and in a manner to keep markings visible.
 - 3. Lift and support the units only at designated lifting points or supporting points as shown on the approved Shop Drawings.

PART 2 - PRODUCTS

2.1 DESIGN

- A. Construct vault according to the dimensions as shown on the plans.
- B. Modification:
 - 1. Provide complete design, calculations, and drawings as called for under Article 1.3 above.
 - 2. Maintain the general design concept as shown, without decreasing or increasing sizes of members and without altering profiles and alignment, except as approved by the Engineer.
 - 3. Make necessary provisions in the design to accommodate stress to be encountered.
- C. Standards:
 - 1. Design in accordance with pertinent recommendations contained in:
 - a. ACI 301.
 - b. ACI 304.
 - c. ACI 311.
 - d. ACI 318.
 - e. ACI 347.
 - f. CRSI "Manual of Standard Practice".
 - g. PCI 116.
 - 2. Comply with requirements of governmental agencies having jurisdiction.
 - 3. In the event of conflict between or among standards, the more stringent provision shall govern unless directed otherwise by the Engineer.

2.2 REINFORCEMENT AND CONNECTION MATERIALS

- A. Provide reinforcement, accessories, and connection materials required in accordance with the final design as approved by the Engineer.
- B. Standards:
 - 1. Meet or exceed the quality specified for similar materials under other Sections of these Specifications.
 - 2. For materials not specified under other Sections of these Specifications, but required for a complete and proper installation, provide new materials, first quality of their respective kinds, as selected by the Contractor subject to the approval of the Engineer.

2.3 CONCRETE

- A. Design strength:
 - 1. Unless otherwise indicated on the Drawings or approved by the Engineer, design the mix and proportion the concrete to attain a minimum compressive strength of 5000 psi when cured and tested at 28 days in accordance with ASTM C 39.
 - 2. Reinforcing steel to meet requirements of ASTM A 615, Grade 60.

2.4 JOINT SEALANT

- A. Provide a vulcanized butyl rubber sealant of adequate size and quantity to seal joints in the precast vault risers.

2.5 FABRICATION

- A. General:
 - 1. Vault to be monolithically poured.
 - 2. Fabricate the work of this Section to the sizes and shapes indicated.
 - 3. Provide finished units that are straight, true to size and shape, and within the specified casting tolerances.
 - 4. Make exposed edges sharp, straight, and square. Make flat surfaces into a true plane.
 - 5. Warped, cracked, broken, spalled, stained and otherwise defective units will not be acceptable.
 - 6. Place and secure in the forms all anchors, clips, stud bolts, inserts, lifting devices, shear ties, and other devices required for handling and installing the precast units and for attachment of subsequent items as indicated or specified.
 - 7. Cast ladder rungs into the units.
 - 8. Provide tongue and groove joints.
 - 9. Provide polypropylene plastic steps reinforced with 3/8" diameter steel rod, M.S.A. Industries, Inc. Model PS-K or equal.
 - 10. Provide a 1" chamfer edge on all exposed edges above grade.
- B. Curing:

1. Form cure the work of this Section for a minimum of 20 hours.
 2. Keep wet continuously for not less than six (6) days after being removed from the forms.
 3. Following the curing period, allow the units to air dry for at least four (4) days before being shipped.
- C. Casting tolerances: Maintain casting, bowing, warping, and dimension tolerances with the following maximums:
1. Overall dimension for height and width of units:
 - a. Plus zero of unit dimension to minus 3/32" for 10'0" and over.
 2. Make thickness of units $\pm 1/8$ " maximum.
 3. Bowing or warping: Do not exceed 1/360 of the span.
 4. Insert locations: Place within $\pm 1/4$ " in each direction.
 5. Opening dimensions to figured dimensions:
 - a. Accurate within a tolerance of plus 1/8" to minus zero.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 COORDINATION

- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.

3.3 INSTALLATION

- A. Install the work of this Section in strict accordance with the original design, the approved Shop Drawings, pertinent requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Engineer, anchoring all components firmly into position for long life under hard use.
- B. Set bases level so that walls will be plumb.
- C. Apply joint sealer or ring gasket to wall section(s), set firmly in place to assure watertight joints.
- D. Powder actuated fasteners: Do not use powder actuated fasteners for surface attachment of accessory items except as specifically approved by the Engineer and specifically accepted by the precast unit manufacturer.

3.4 FINISH

- A. Comply with pertinent provisions of Section 03300 for cast-in-place concrete.

END OF SECTION

SECTION 03410

PRECAST CONCRETE WETWELL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide wetwell structure assembled from precast concrete, as indicated on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 02220 - Excavation and Backfilling for Structures
 - 3. Section 03300 - Cast-in-Place Concrete.

1.2 QUALITY ASSURANCE

- A. Referenced products are G Series precast wetwell components, as manufactured by Tindall Concrete Products, Inc., and are named to establish standards of quality.
- B. Equal products of other manufacturers conforming to these specifications may be provided upon approval by the Engineer.
- C. Provide precast components poured and vibrated using steel forms in a PCI certified manufacturing facility.
- D. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- E. Qualifications of manufacturer: Demonstrate capability to make and provide the specified quality products by attestation of the Prestressed Concrete Institute under the Plant Certification Program.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section.
 - 2. Manufacturer's specifications, calculations and other data needed to prove compliance with the specified requirements.
 - a. Project specific design calculations for all components, showing design loads at the depths indicated on the Drawings, signed and sealed by a professional engineer licensed to practice in the state of South Carolina.

3. Manufacturer's certifications and laboratory test reports as required.
4. Shop drawings showing complete information for fabrication and erection of the work of this Section including, but not necessarily limited to:
 - a. Erection procedures, lifting lugs, sequence of erection, and required handling equipment.
 - b. Layout, dimensions, and identification of each precast unit corresponding to the sequence and procedure of installation.
 - c. Details of inserts, connections, and joints, including accessories and construction at openings in the precast units.
 - d. Location and details of anchorage devices that are to be embedded in other construction.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01640.
- B. Delivery, storage and handling:
 1. Deliver products to the job site in such quantities and at such times as to assure the continuity of construction.
 2. Store units at the job site in a manner to prevent cracking, distortion, warping, staining and other physical damage, and in a manner to keep markings visible.
 3. Lift and support the units only at designated lifting points or supporting points as shown on the approved Shop Drawings.

PART 2 – PRODUCTS

2.1 DESIGN STANDARDS

- A. Design in accordance with pertinent recommendations contained in:
 1. ACI 301.
 2. ACI 304.
 3. ACI 311.
 4. ACI 318.
 5. ACI 347.
 6. CRSI "Manual of Standard Practice".
 7. PCI 116.
 8. AASHTO standard specifications, minimum load rating: HS20.
- B. Comply with requirements of governmental agencies having jurisdiction.
- C. In the event of conflict between or among standards, the more stringent provision shall govern unless directed otherwise by the Engineer.
- D. Minimum design criteria, unless otherwise indicated on the drawings or specified herein:
 1. Soil weight of 130 pcf.
 2. Soil angle of internal friction of 10°.
 3. Groundwater depth to top of wetwell.

2.2 COMPONENTS

A. General:

1. Provide standard precast concrete shapes as required for a complete concrete wetwell structure, as indicated on the Drawings.
2. Inside diameter and vertical laying lengths as shown on the contract drawings.
3. Provide monolithically poured components with a minimum 28-day compressive strength of 5,000 psi as determined by Standard ASTM Test Procedures.
4. Provide reinforcing steel as required by ASTM C478.

B. Top:

1. Manufacturer to provide cast-in access hatch or cover as indicated on the Drawings or otherwise specified in Section 05990.
2. Provide steps where laying length allows, unless otherwise indicated.
3. Provide ASTM A416 steel strand lift loops as required for lifting and positioning during installation.

C. Risers:

1. Provide steps where laying length allows, unless otherwise indicated.
2. Provide non-penetrating lift holes as required for lifting and positioning during installation.

D. Base:

1. Provide base with extended bottom slab.
 - a. Minimum overhang, 12".
2. Provide steps where laying length allows, unless otherwise indicated.
3. For bases 6' in diameter or less, provide non-penetrating lift holes as required for lifting and positioning during installation.
4. For bases greater than 6' in diameter, provide ASTM A416 steel strand lift loops as required for lifting and positioning during installation.

2.3 JOINT SEALS

A. Internal seals:

1. Comply with ASTM C990.
2. Minimum diameter of 1".
3. Minimum continuous length of 14' - 6".

B. Exterior joint collar:

1. Install an exterior joint collar on all manhole joints.
2. Provide a 7" wide band.
 - a. Provide an outer layer of polyethylene with an under layer of rubberized mastic reinforced with a woven polypropylene fabric.
 - b. Provide a peelable protective paper against the mastic that is removed when the collar is applied to the joint.

- c. Within the collar, locate two steel straps 5/8" wide 3/4" from each edge of the band.
 - d. Install the straps in tubes that isolate them from the mastic and allow them to slip freely when tightened around the pipe.
 - e. Design the collar so that when it is applied around the joint the ends overlap at least 6" and when the straps are secured a layer completely covers the straps protecting them from moisture and rust.
3. Provide MacWrap Exterior Joint Sealer as manufactured by Mar-Mac Manufacturing Company or an approved equal.

2.4 STEPS

- A. Do not provide steps inside wetwell.

PART 3 – EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed.
 - 1. Correct conditions detrimental to timely and proper completion of the Work before beginning.
- B. Provide shoring, pilings or temporary support as required for the protection of existing structures and utilities.
 - 1. Where sheet piling or other construction work is required, retain the services of a professional engineer licensed by the State of South Carolina and qualified to provide design services for the work.
- C. Protection of existing structures and utilities is the sole responsibility of the Contractor.

3.2 COORDINATION

- A. Coordinate work with the Owner to ensure continuous operation of existing utilities.
- B. Coordinate with other trades as required for timely completion of the work.

3.3 INSTALLATION

- A. Begin excavation only after all shoring, pilings and temporary supports are complete and all sediment and erosion control measures are in place.
- B. Lift and place all precast concrete components in accordance with the manufacturer's recommendations and the approved shop drawings.
- C. After placement of components with steel lifting loops, cut off lifting loops a minimum of 2" below the finished surface and patch hole with non-shrink grout.
- D. Interior joint sealant: Place rope seal in the keyway of all precast joints just prior to installation of the next concrete unit.

1. Place seal in a clean, dry keyway.
- E. Install exterior joint collar.
1. Follow manufacturer's recommendations.
 2. Clean surface.
 3. Remove the protective paper and place the band around the manhole, mastic side to the manhole and spanning the joint.
 4. Secure the steel straps with the manufacturer's recommended tools.
 5. Cover exposed strap with the closing flap.
- F. Provide additional bottom slab area, as indicated on the Contract Drawings.
1. Comply with Section 03300 - Cast-in-Place Concrete.

3.4 MEASUREMENT AND PAYMENT

- A. No separate measurement or direct payment will be made for the work under this Section and all costs for same shall be included in the price bid for the item to which it pertains.

END OF SECTION

SECTION 09900

PAINTING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Prepare, paint and finish the exterior and interior surfaces indicated or specified, and as needed for a complete and proper installation.
 - 1. Surfaces not specifically excluded shall be painted, whether new or old including concealed metal surfaces.
- B. Work not included: Unless otherwise indicated, painting of following surfaces will not be required.
 - 1. Concealed areas and inaccessible areas such as furred spaces, foundation spaces, utility tunnels, pipe spaces, and duct shafts.
 - 2. Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar non-ferrous materials.
 - 3. Moving parts of operating units, mechanical or electrical parts such as valve operators, linkages, sensing devices, and motor shafts.
 - 4. Exterior concrete surfaces, including interior walls of treatment tanks.
 - 5. PVC piping systems.
 - 6. Instruments, control panels, chlorinators, etc. having factory applied finishes.
 - 7. Do not paint over required labels or equipment identification, performance rating, name, or nomenclature plates.
- C. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Priming or priming and finishing of certain surfaces may be specified to be factory performed or installer performed under pertinent other Sections.
- D. Definitions: "Paint", as used herein, means coating systems materials including primers, emulsions, epoxy, enamels, sealers, fillers and other applied materials whether used as prime, intermediate or finish coats.

1.2 QUALITY ASSURANCE

- A. Referenced manufacturers in the paint schedule are Tnemec Company, Inc. and Ameron, Protective Coatings Division, and are named to establish standards of quality. Equal products of other manufacturers may be provided for the project upon approval by the Engineer.
 - 1. Referenced manufacturer for brick masonry coating is Belzona Molecular, Inc., of Long Island, NY.

- B. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- C. Paint coordination:
 - 1. Provide finish coats which are compatible with the prime coats actually used.
 - 2. Review other Sections of these Specifications as required, verifying the prime coats to be used and assuring compatibility of the total coating system for the various substrata.
 - 3. Upon request, furnish information on the characteristics of the specific finish materials to assure that compatible prime coats are used.
 - 4. Provide barrier coats over noncompatible primers, or remove the primer and reprime as required.
 - 5. Notify the Engineer in writing of anticipated problems in using the specified coating systems over prime coatings supplied under other Sections.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section.
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
- C. Color chips: Provide for each type of finish coat required.
- D. Schedule:
 - 1. Submit schedule listing of all surfaces to be painted, manufacturer's name, generic type, trade or brand name, system for each surface including number of coats and total dry film thickness.
 - 2. Secure Engineer's approval of schedule, in writing, prior to ordering any materials.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01640.
- B. Deliver all material to site in original, new, unopened containers, labeled and bearing manufacturer's name and stock number, product and brand name, contents by volume for major constituents, instructions for mixing and reducing, and application instruction.
- C. Provide adequate storage facilities designed exclusively for the purpose of paint storage and mixing.
- D. Facility area shall be located away from open flames, be well ventilated, and be capable of maintaining ambient storage temperature of no less than 45°F.

- E. Paint, coatings, reducing agents, and other solvents must be stored in original containers until opened. If not resealable, then must be transferred to UL approved safety containers.
- F. Provide proper ventilation, personal protection and fire protection for storage and use of same. Comply with requirements set forth by Occupational Safety and Health Act for storage and use of painting materials and equipment.

1.5 EXTRA STOCK

- A. Upon completion of the work of this Section, deliver to the Owner at least one gallon of each color, type, and gloss of paint used in the Work, tightly sealing each container and clearly labeling with contents and location where used.

PART 2 - PRODUCTS

2.1 PAINT MATERIALS

- A. Source of all paint material is subject to approval by the Engineer.
- B. All paint material which will be in contact with potable water shall have the approval of the South Carolina Department of Health and Environmental Control (SCDHEC) for such use.
- C. All paint materials to be used in any one system shall be the products of one manufacturer.
- D. Where products are proposed other than those specified by name and number in the Painting schedule, provide under the product data submittal required by Article 1.3 of this Section a new painting schedule compiled in the same format used for the Painting Schedule included in this Section.
- E. Use only the thinners recommended by the paint manufacturer, and use only to the recommended limits.

2.2 COLOR SCHEDULE

- A. The Engineer will prepare a color schedule for guidance in the painting.

2.3 APPLICATION EQUIPMENT

- A. Use only such equipment as is recommended by the paint manufacturer.

2.4 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 ENVIRONMENTAL CONDITIONS

- A. Do not work under unfavorable weather conditions.
 - 1. Air and surface temperatures must be above 45°F and dew point not within 5° of surface temperature.

3.3 SURFACE PREPARATION

- A. General:
 - 1. Prepare and clean all surfaces to be painted in a workmanlike manner with the objective of obtaining a smooth, clean and dry surface, free from cracks, ridges, nail holes, etc.
 - 2. Remove or mask items not to be painted.
 - 3. Schedule cleaning and painting so that dust and other contaminants from cleaning operations will not fall onto newly painted surfaces.
- B. Ferrous metals:
 - 1. Remove all rust, dust, scale and other foreign substances.
 - 2. Give welded joints special attention, removing all welding flux, slag and weld spatter.
- C. Non-ferrous metals: Solvent clean prior to shop or field application of pretreatment and/or primer.

3.4 MATERIALS PREPARATION

- A. General:
 - 1. Mix and prepare paint materials in strict accordance with the manufacturer's recommendations as approved by the Engineer.
 - 2. When materials are not in use, store in tightly covered containers.
 - 3. Maintain containers used in storage, mixing, and application of paint in a clean condition, free from foreign materials and residue.
- B. Stirring:
 - 1. Stir materials before application, producing a mixture of uniform density.
 - 2. Do not stir into the material any film which may form on the surface, but remove the film and, if necessary, strain the material before using.

3.5 PAINT APPLICATION

- A. General:
 - 1. Touch-up shop applied prime coats that have been damaged, and touch-up bare areas prior to start of finish coats application, as per Paragraph 3.7.

2. Slightly vary the color of succeeding coats.
 - a. Do not apply additional coats until the completed coat has been inspected and approved.
 - b. Only the inspected and approved coats of paint will be considered in determining the number of coats applied.
 3. Sand and dust between coats to remove defects visible to the unaided eye from a distance of five (5') feet.
 4. On removable panels and hinged panels, paint the back sides to match the exposed sides.
- B. Drying: Allow sufficient drying time between coats, modifying the period as recommended by the material manufacturer to suit adverse weather conditions.
- C. Brush or roller applications:
1. Brush or roll coats onto the surface in an even film.
 2. Cloudiness, spotting, holidays, laps, brush or roller marks, runs, sags, ropiness and other surface imperfections will not be acceptable.
- D. Spray application:
1. Except as specifically otherwise approved by the Engineer, confine spray application to metal framework and similar surfaces where handwork would be inferior.
 2. Where spray application is used, apply each coat to provide the hiding equivalent of brush coats.
 3. Do not double back with spray equipment to build up film thickness of two coats in one pass.

3.6 PAINTING SCHEDULE

- A. Provide one prime coat (shop or field) and two finish coats, unless otherwise specified, in accordance with the following.
- B. Systems:
1. In the schedules following, the type of paint system is identified by symbol in parenthesis immediately behind the manufacturer's name:
 - a. Epoxy (E)
 - b. Coal Tar Epoxy (CTE)
 - c. Chlorinated Rubber (CR)
 - d. Alkyd (A)
 - e. Acrylic (AC)
 - f. Acrylic Latex (ACL)
 - g. Vinyl (V)
 - h. Latex (L)
 - i. Modified Epoxy (ME)
 - j. Enamel (EN)
 - k. Acrylic Emulsion (ACE)
- C. Ferrous metal submerged:
1. Surface preparation: SSPC-SP10 Near-White Blast Cleaning.

Manufacturer	Prime Coat	Finish Coats	Min Total Dry Mil Thickness
Tnemec (CTE)	66-1211 Epoxoline Primer	46-413 Tneme-Tar	18.7
Ameron (CTE)	Amercoat 385	Amercoat 75 HB	18.5

D. Ferrous metal, including ductile iron, non-immersion and exterior:

1. Surface preparation: SSPC-SP6 Commercial Blast Cleaning (fabrications) or SSPC-SP3 Power Tool Cleaning.
2. For ductile iron, "MC-FerroClad Primer, 3.0-5.0 dry mils", by Wasser High-Tech Coatings, may be substituted for the prime coat.
3. System: Tnemec (HBU):

Prime Coat	Series 37-H Chem-Prime, 3.0 dry mils
2nd Coat	Series 37-H Chem-Prime, 3.0 dry mils
3rd Coat	74-Color Endura-Shield III, 4.0 dry mils
4th Coat	76 Endura-Clear w/Series 44-500 Skip Safe Additive 1.5 dry mils

4. System: Ameron (HBU):

Prime Coat	Amercoat 385P, 4.0 dry mils
2nd Coat	Amercoat 385, 4.0 dry mils
3rd Coat	Amershield, 5.0 dry mils
4th Coat	Clear Polyurethane, 1.5 dry mils

5. Type finish: Gloss.

E. Cast iron or ductile iron pipe, bituminous coated:

1. Provide two prime coats as specified below and finish with two coats of appropriate metal finish as specified in paragraphs 3.6C or 3.6D above.

Manufacturer	Prime Coat
Tnemec	66 Epoxoline Primer
Ameron	Amercoat 385

3.7 TOUCH-UP OF APPLIED COATINGS

A. Prior to any touch-up, the area is to be SP-3 brush cleaned.

B. Shop applied coatings:

1. Shop applied coatings with specified primer, as listed in Part 3.6 above, shall be touched up with the same listed primer before any topcoat(s) are applied.
2. Shop applied coatings with manufacturer's standard paint shall be touched up with a compatible barrier coating, Tnemec Series 50-330 Poly-Ura-Prime for 3.6D, Tnemec Series 59 Varaprime for 3.6E or Ameron Amercoat 385.
 - a. Manufacturer shall notify the Engineer in writing if the manufacturer's standard paint is unable to receive the specified top coat(s) or if problems are anticipated due to incompatible coating systems.

C. Field applied coatings:

1. After cleaning, apply specified primer followed by specified finish coats.

3.8 INSPECTION AND ACCEPTANCE

- A. Examination of overall appearance and measurement of dry film thickness.
- B. Correct defects and/or deficiencies to satisfaction of the Engineer.

3.9 MEASUREMENT AND PAYMENT

- A. No separate measurement or direct payment will be made for the work under this Section and all costs for same shall be included in the price bid for the item to which it pertains.

END OF SECTION

SECTION 11293

PLUG VALVES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide plug valves at all locations indicated on the Drawings, and as specified herein, complete and ready for operation.
- B. Related work: Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Referenced manufacturer is DeZurik Water Controls and is named to establish standards of quality. Equal products of other manufacturers conforming to these specifications, and as outlined in the bid form may be provided upon approval by the Engineer.
- C. Manufacturers to have a minimum of ten (10) years operating experience for the specified valve style.
- D. Provide valves with castings and all other components manufactured in the United States.
 - 1. Foreign made components may be provided if manufacturer meets ISO 9000 requirements.
 - 2. Perform final assembly and testing at the manufacturer's factory located in the United States.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section.
 - a. Provide listing of all valves to be provided and include type of valve and location.
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
 - 3. Shop drawings showing sectional views, dimensions, end connections, and operator details.
- C. Provide Maintenance manuals complying with provisions of Section 01650.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01640.

1.5 WARRANTY

- A. Provide a standard two-year warranty on all labor and materials.
- B. The warranty will begin upon successful completion of the initial operating period.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide non-lubricated, eccentric type plug valves having resilient faced plugs, complying with AWWA Standard C517 and other requirements specified herein.
- B. Furnish flanged or mechanical joint end connections as indicated on the Drawings.
- C. Provide valves of bolted bonnet design:
 - 1. Valves 3" and larger to be designed to allow packing inspection and replacement without removing the bonnet or actuator and the packing shall be adjustable.
 - 2. Packing to be replaceable with the valve under pressure with valve open or closed with pressure on either side of the plug.
- D. Provide valves capable of drip-tight shutoff up to full rating with pressure in either direction. Pressure ratings shall be 175 psi for 3" through 12 and 150 psi for 14" and larger.
- E. Provide cast iron valve bodies complying with ASTM A 126, Class B and AWWA Standard C517.
 - 1. For sizes 3"-36", provide flushing design to prevent pooling in the body.
- F. Provide one piece plugs cast of ASTM A536 ductile iron.
- G. All exposed nuts, bolts, springs, etc. shall be stainless steel on all valves.

2.2 PORT AREAS

- A. Provide minimum 100% full pipe area on sizes 3"-60".
- B. Provide rectangular port; round ports are not acceptable.

2.3 SEATS

- A. Provide corrosion resistant seats complying with AWWA Standard C507-73 and AWWA Standard C517.

- B. Three inch and larger valves to have a 1/8" thick welded-in overlay of not less than 95% nickel content on all surfaces contacting the plug face.
 - 1. Seat to be 1/2" wide and raised 1/8" from the valve body and machined to a smooth finish.
- C. Screwed in or bolted in seats are not acceptable.
- D. Plug shall not contact seat prior to 90% closed.

2.4 BEARINGS

- A. Provide valves with permanently lubricated, Type 316 stainless steel bearings in the upper and lower plug stem journals.
- B. Bearings to comply with AWWA Standard C517.
- C. Lower bearing housing to be raised from the body to reduce the possibility of grit and sand entering the bearing housing.
- D. Provide grit excluders to prevent entry of grit and solids into the upper and lower bearings areas.

2.5 FLANGED END CONNECTIONS

- A. Provide, where indicated, valves with flanged ends, faced and drilled to ANSI 125/150 lb. standard.
- B. Flanged valves through 12" to have face-to-face dimensions of AWWA Standard for standard gate valves.
- C. Face-to-Face dimensions per AWWA C517, table 1. Short Body for sizes 3"-12" and Long Body for 14" and larger.

2.6 RESILIENT PLUG FACING

- A. Provide neoprene plug facings vulcanized to the plug and suitable for use with domestic wastewater. Plug facing bond strength shall meet test methods as described in ASTM D429 method B (75 psi test).
- B. Plug to be one piece with integral stem through the actuator.
- C. Do not use plugs with cast inlays.

2.7 BURIED SERVICE VALVES

- A. Provide seals on all shafts and gaskets on valve covers to prevent entry of water and dirt.

2.8 PRESSURE GAUGE TAPS

- A. Provide 1/4" tap with plug on both ends of the valve for pressure gauge connections.

2.9 ACTUATORS

- A. Manual valves to be provided with lever or gear actuators and tee wrenches, extension stems, floor stands, chainwheels, etc., as indicated on the Drawings.
 - 1. Provide a lever for each lever-operated valve.
 - 2. Provide one tee wrench for every five valves utilizing the tee wrench operation.
- B. Valves furnished for installation in a valve box to be provided with a 2" square operating nut and Type 304L stainless steel extension within 18" of the top of the valve box.
- C. Provide 4" and larger valves with gear actuators.
 - 1. Provide gear to fit on a round shaft with keyway to allow operation without the use of roll pins.
 - a. Provide 4 keyways at 90 degrees on the shaft to allow for adjustment of the actuator.
 - b. Adaptor between plug shaft and actuator shaft is not acceptable.
 - 2. Handwheel and chainwheel components between the input and the stop-limiting devices to be designed to withstand, without damage, a pull of 200 lbs. as required by the American Water Works Association (AWWA) Standard C504-74 Section 11.2.3.
 - 3. Pulley and chain for chainwheel actuators to be 316 stainless steel unless otherwise noted on the plans.
 - 4. Gear sector to handwheel diameter ratio not to exceed 2.0:1.
 - 5. Provide outboard seals on gear sector of gearbox housing to protect the bearings and other components.
 - 6. Gear actuators, normal service:
 - a. Enclose all gearing in semi-steel housing suitable for running in a lubricant with seals provided on all shafts to prevent entry of dirt or water into the actuator.
 - b. Support actuator shaft and quadrant on permanently lubricated bronze bearings.
 - c. Provide valve position indicator and an adjustable stop to set closing torque.
 - d. All exposed nuts, bolts and washers to be stainless steel.
 - e. Provide air gap between the actuator and the valve body to prevent leakage from the valve into the actuator.
 - i. Minimum distance of gap between actuator and body to be 1.38 inches.
 - f. Minimum distance of gap between actuator and body to be 1-3/8 inches.
 - 7. Gear actuators, buried service:
 - a. Provide neoprene seals on all shafts and gaskets on actuator covers to prevent entry of water and dirt.
 - b. Mounting brackets to be totally enclosed with gasket seals.
 - c. Support actuator shaft and quadrant on permanently lubricated bronze bearings.
 - d. All exposed nuts, bolts and washers to be stainless steel.

PART 3 - EXECUTION

3.1 GENERAL

- A. Handle, store and install all valves complying with the manufacturer's recommendations and the Drawings.
- B. Valves installed in horizontal pipe runs shall be mounted with the plug horizontal and at the top of the body when the valve is open.

3.2 PAINTING

- A. Exposed valves:
 - 1. Factory painting:
 - a. Sandblast to SSPC-10 Near White Metal.
 - b. Prime exterior with Tnemec 66-1211 Epoxoline Primer, 3.0 dry mils.
 - c. Paint interior of valve with two coats of coal tar epoxy, TNEMEC Hi-Build Tneme-Tar, minimum 14 mils dry thickness.
 - 2. Field painting: Comply with pertinent provisions of Section 09900.
- B. Buried valves:
 - 1. Sandblast to SSPC-10 Near White metal.
 - 2. Paint exterior and interior of valve with two coats of coal tar epoxy, TNEMEC Hi-Build Tneme-Tar, minimum 14 mils dry thickness.

3.3 MEASUREMENT AND PAYMENT

- A. No separate measurement or direct payment will be made for the work under this Section and all costs for same shall be included in the price bid for the item to which it pertains.

END OF SECTION

SECTION 11298

SEWAGE SURGE RELIEF VALVE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide sewage surge relief valve as shown, specified, and as needed to provide a complete and proper installation.
- B. Related work: Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Referenced Manufacturer is Ross Valve and is named to establish standards of quality. Equal products of other manufacturers meeting all requirements of this specification may be provided as outlined in the Bid Form and as approved by the Engineer.
- B. Supplier shall have been manufacturing sewage relief valves for a period of at least ten (10) years and shall, at the request of the Engineer, provide a list of installations involving equipment of similar size and application.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 45 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
 - 2. Shop drawings showing plan, elevation and sectional views, materials of construction, and other pertinent information.
 - 3. Provide Operation and Maintenance manuals complying with Section 01650.

1.4 PRODUCT DELIVERY

- A. Comply with pertinent provisions of Section 01640.

1.5 START-UP

- A. Provide a service engineer complying with the requirements of Section 01660.
 - 1. Start-up and performance testing: One Day – One Trip.

PART 2 - PRODUCTS

2.1 SURGE RELIEF VALVE

- A. Provide 4-inch valve, globe body configuration arranged for a 4 inch flanged inlet, 4 inch flanged outlet and factory set to open at 88 psi.
 - 1. Valve to be a Ross Valve Model 70SWR Waste Water Relief Valve.
- B. The valve controls water systems where water hammer may occur and is a hydraulic operated piston style valve. The valve is controlled from adjustable hydraulic pilot mounted in the control piping, to prevent excessive pressure in the waterline. Should the controlled pressure approach the set point, the valve will throttle to relieve excess pressure. When the inlet pressure falls below the set point, the valve shall close.
- C. The main valve shall operate on the differential piston principal, with free floating piston, operated without springs, or levers, and with a single seat with full ported seat bore equal to the size of the valve. The minimum travel of the piston shall be equal to 25% of the diameter of the seat.
- D. The main valve shall be completely piped ready for installation. Piping shall include isolation valves, for removal of the pilot from the main valve while the main valve is under pressure, a blow off valve and strainer assembly. Piping and fittings shall be made from rigid brass.
- E. The hydraulic pilot shall be of bronze or stainless steel construction and have an adjustment range of approximately 20% from above or below the factory setting.
- F. The valve shall be capable of operating in any position and shall incorporate a flanged cover at the top from which all internal parts shall be accessible.
- G. The valve seals shall be easily renewable while no diaphragm shall be permitted within the main valve body.
- H. A visual valve position indicator shall be provided for observing the valve piston position at any time.
- I. The main valve shall have gauge cocks for testing purposes.
- J. All internal parts with the exception of the main valve body and cover shall be made from ASTM B-62 Bronze or stainless steel.
- L. The main valve body and covers shall be coated with NSF approved epoxy coating inside and out.
- M. The main valve body shall be made from extra heavy first class grey iron to meet ASTM A-126 Class B, and have flanges conforming to ANSI class standards.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install valve in piping system as shown and in compliance with all recommendations of the manufacturer.

3.2 MEASUREMENT AND PAYMENT

- A. No separate measurement or direct payment will be made for the work under this Section and all costs for same shall be included in the price bid for the item to which it pertains.

END OF SECTION

SECTION 11313

SUBMERSIBLE SEWAGE PUMPS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide submersible sewage pumps for one duplex lift station, each station including, but not necessarily limited to the following:
 - 1. Two (2) submersible sewage pumps.
 - 2. Motor control center with liquid level control system (Including floats).
 - 3. Provide station complete and ready for operation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 01650 - General Equipment Requirements.
 - 3. Section 16400 - Electrical.

1.2 QUALITY ASSURANCE

- A. Referenced manufacturer is the Grundfos, and is named to establish standards of quality.
- B. The Contractor's attention is directed to the fact that the pumps and controls are an integrated system in the view of the Engineer and as such shall be furnished by one vendor who shall provide all the equipment and appurtenances regardless of the manufacture, and be responsible to the Contractor for satisfactory operation of the total system.
- C. The pump manufacturer shall have a minimum of 1,000 pumping units of similar type pumps, installed and operating for not less than five (5) years in the United States.
- D. Technical services:
 - 1. Provide a service engineer, complying with requirements of Section 01660 for the following periods of time for each pump station:
 - a. For start-up and performance testing: Two days - Two trips.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

2. Shop drawings showing plan, elevation and sectional views, materials of construction, and other pertinent information.
- C. Five (5) copies of factory and field test reports.
- D. Provide Operation and Maintenance manuals complying with Section 01650.

1.4 PRODUCT DELIVERY

- A. Comply with pertinent provisions of Section 01640.

1.5 SPARE PARTS

- A. Provide the following minimum spare parts:
 1. One of each type relay.
 2. One pump starter.
 3. One pump alternator.
 4. One of each type pilot light.
 5. One box of each type of fuse.
 6. One set of cable grommets.
- B. Package in one container all spare parts and clearly identify on the outside what the unit is for.
 1. Seal tightly and properly protect for long term storage.
 2. Deliver to the Engineer for transmittal to the Owner.

1.6 WARRANTY

- A. Comply with provisions of Section 01650.
- B. The pump manufacturer shall warrant the units being supplied to the Owner against defects in workmanship and material for a period of five (5) years or 10,000 hours under the Warranty Policy under normal use, operating and service. The warranty shall be in printed form and apply to all similar units.

PART 2 - PRODUCTS

2.1 PUMPS

- A. General:
 1. Provide submersible pumps capable of pumping raw sewage.
 2. Provide 4-inch discharge with ANSI 125 lb standard cast iron flange fitting or cast with volute.
 3. Provide pump openings and passages adequate to pass 3" diameter sphere and any trash or stringy material that can pass through an average house collection system.
 4. Pump components shall be cast iron, ASTM A 48, Class 30 and all exposed fasteners and washers shall be Type 304 stainless steel or brass.
 5. Pump lift handle to be Type 304 stainless steel.

6. Coat all components, except stainless steel, coming into contact with sewage with a sewage resistant coating.

Coat pump exterior with a powder coated epoxy paint with the following:

- a) Cleaning: Sand blast SA 2 ½ at foundry
- b) Grease and rust removing with solvent
- c) Primary paint layer: Epoxy 40 microns at foundry
- d) Finishing paint layer: Dry film thickness 150 microns
- e) Paint: Temacoat HB 30, two-component resin modified epoxy paint
- f) Color: NCS 9000 N / RAL 9005 gloss 30 (nearly black)

B. Impeller:

1. The impeller shall be dynamically balanced, semi-open, non-clogging vortex in design capable of handling solids, fibrous materials, heavy sludge and other matter found in wastewater.
2. The impeller shall have a back shroud only and curved blades which protrude into the pump casing for maximum efficiency. The vane tips shall have machined tip edges to minimize the formation of eddy currents which tend to separate solids and decrease efficiency.
3. The impeller will create a vortex which carries solids through the pump casing without passing through the blades.

C. Volute: Provide single piece, non-concentric design with smooth fluid passages large enough at all points to pass any size solids which can pass through the impeller.

D. Shaft: Provide AISI Type 431 stainless steel.

E. Bearings:

1. The pump shaft shall rotate on two (2) permanently lubricated bearings with a B-10 bearing life of 50,000 hours.
2. The upper bearing shall be single deep groove ball bearing.
3. The lower bearing shall be a two-row angular contact ball bearing.

F. Watertight seals:

1. Machine and fit all mating surfaces where watertight sealing is required with nitrile rubber O-rings.
2. Fittings shall be such that sealing is accomplished by metal-to-metal contact between machined surfaces.
3. Do not provide gaskets, elliptical O-rings, grease or other devices.

G. Mechanical seals:

1. Two mechanical seals shall be installed in tandem, totally enclosed within a common Duplex Stainless Steel cylinder.
2. The cylinder, with the entirety of both seals, shall be located entirely within an oil-filled chamber with drain and inspection plug (with positive anti-leak seal) for easy access from external to the pump.

3. All seals and seal springs shall be located completely inside of the seal oil chamber where they are completely isolated from the pump media and cannot be fouled by rags or other stringy material as can happen with common dual seal set designs.
4. Seal faces shall be silicon carbide both faces on the lower seal and at minimum carbon on ceramic on the upper seal.
5. The seals shall require neither routine maintenance nor adjustment, but capable of being easily inspected and replaced.

H. Performance:

1. Select each pump to have the necessary characteristics to perform under these operating conditions:

Grundfos Model Number	SL1.30.A40.100.A.EX.4.61R.C
Capacity (gpm)	280
TDH (feet)	65
Efficiency (%)	90.7
Maximum shut-off head (feet)	84
Maximum speed (rpm)	1750

2. Total discharge head (TDH) as listed on schedule herein does not include losses in the pump from the suction flange to the discharge flange. Therefore, provision shall be made in the design of the pump to accommodate this additional head. These losses shall also be included in the pump efficiencies. The efficiency listed is field efficiency and includes the efficiencies of the bowl corrected for all losses chargeable to the pump, including losses for shafts, column, and discharge head or elbow. Motor efficiency is not included in the field efficiency.

2.2 PUMP MOTOR

A. General:

1. Provide submersible type motor, designed for continuous duty, capable of sustaining a minimum of fifteen (15) starts per hour.
2. Furnish motor and pump as integral unit.
3. Air filled, squirrel cage induction, shell type design, with Class H insulation system and Class H materials rated for continuous duty in 40° C (104° F) liquids.
4. Furnish motor frame and end shields of cast iron.
5. Provide stainless steel hardware and shaft.
6. Service factor to be 1.15.
7. Provide stator heat-shrink fitted to shaft.
 - a. Dip and bake stator in Class H varnish.
 - b. Do not use bolts, pins or other fastening devices requiring penetration of the stator housing.
8. Provide rotor bars and short circuit rings of aluminum.
9. Motor to be non-overloading through the range of pump's operating curve.
10. The motor shall be FM listed for use in Class I Division 1 Groups C&D hazardous locations as defined by the National Electric Code.
11. The same motor shall also be CSA Approved.
12. Motor insulation shall fulfill NEMA MG1 part 31 requirements for inverter duty.
13. The motor and pump set complete shall be designed and manufactured by the

same company.

- B. The pump shall be provided with 50 feet of power/control cable with each pump, suitable for submersible wastewater application, sized in accordance with NEC requirements. Provide cable terminal box on side of motor housing, with the cable entry triple sealed to insure that no entry of moisture is possible into the high-voltage motor/ terminal area even if the cable is damaged or severed below water level.
1. The cable shall be a plug-in design with male / female connectors so that it is easily removed from the pump and replaced in the field without the need for electrical connections or special tools.
 2. A union nut shall be provided on the female cable side plug for tightening to the matching male receptacle on the pump.
- C. Provide pre-lubricated bearings with minimum B-10 life of 50,000 hours.
- D. Thermal protection:
1. Provide motor rated thermally to NEMA MG1-12.42.
 2. Protect by means of three (3) thermostatic switches (one in each phase) in the stator windings.
- E. Junction chamber:
1. Seal the junction chamber containing the terminal board from the motor by elastomer compression seal (O-ring).
 2. Make the connection between the cable conductors and stator leads with threaded compressed type binding, post permanently affixed to a terminal board.
- F. Cooling:
1. Provide an adequately designed cooling jacket.
 2. Cooling jacket to be a closed loop, glycol cooling system with a stainless steel jacket.
- G. Motor characteristics shall be:

Minimum Motor Hp	10
Speed (rpm)	1750
Operational Current	460 volt, 3 phase

2.3 DISCHARGE CONNECTION

- A. Provide a permanently installed discharge connection system which will permit removal and installation of pump without the necessity of an operator entering the wetwell.
- B. The pump(s) shall be automatically connected to the discharge connection elbow when lowered into place, and shall be easily removed for inspection or service.
- C. Sealing of the pumping unit to the discharge connection elbow shall be accomplished by a simple linear downward motion of the pump.
- D. Provide a sliding guide bracket to be an integral part of the pump unit.

- E. The entire weight of the pumping unit shall be guided by no less than two guide bars and pressed tightly against the discharge connection elbow with metal-to-metal contact.
- F. Do not use a diaphragm, o-ring or other devices to interface sealing of the discharge.
- G. Do not bear any portion of the pump directly on the floor of the sump.

2.4 DISCHARGE ELBOW

- A. Cast from gray cast iron complying with ASTM A 48, Class 30.
- B. Provide vertical leg with 4-inch ANSI Class 125 lb. flange.
- C. Provide horizontal or inlet leg with a flat machined face for forming an effective seal with the lip seal on pump.
- D. Provide elbow with an integral cast iron base for anchoring and support of discharge piping and pump to wetwell floor.

2.5 GUIDE RAILS

- A. Provide for each pump two lengths of 2", Schedule 40, Type 304 stainless steel pipe with pilots as indicated on contract drawings.
- B. Provide Type 316 stainless steel bottom and top pilots, Halliday Metals or equal.

2.6 PUMP GUIDES

- A. Attach to pump volute with stainless steel head cap screws.

2.7 LIFT CHAIN WITH GRIP EYE

- A. Provide each pump and motor with adequately sized stainless steel lifting chain, 1/8" stainless steel wire guide rope and grip eye.
- B. Provide a 2'-0" length of minimum 1/4" welded stainless steel link chain.
- C. Length of wire rope shall reach top of station plus an additional 6 feet.
- D. Provision shall be made for attaching upper end of wire rope to the wetwell access frame with Type 316 stainless steel clip and Type 316 stainless steel eye nut.
- E. Connect chain to pump using a Type 316 stainless steel screw pin shackle.

2.8 HARDWARE

- A. All bolts, machine screws, nuts, washers, and lockwashers for complete assembly of wetwell access cover, guide rails, and discharge elbow shall be furnished by manufacturer in Type 316 stainless steel.

2.9 WETWELL ACCESS

- A. Fabricate from welded aluminum sections.
- B. Provide hinged door of 1/4" aluminum treadplate for each pump.
- C. Upper surface shall be flush, with no protrusions.
- D. Fit door with recessed latch requiring a special square tool for access.
- E. Provide all hardware of Type 316 stainless steel.
- F. Provide Type 316 stainless steel support bracing with a self-locking hinge mechanism to lock into open position.
- G. Provide a recessed padlock hasp.
- H. Provide OSHA approved lettering on the top of the hatch stating "Confined Space Do Not Enter Without a Permit".
- I. Provide an aluminum safety grate system to cover the opening in accordance with OSHA 1910.23.
 - 1. Allow for visual inspection and float adjustment with grate in place.
 - 2. 300 psf pedestrian rated.
 - 3. Lockable.
 - 4. Provide pull open arm to safely position operator when opening the grate.
 - 5. Provide safety orange TGIC epoxy powder coating.
- J. Provide "Safe Hatch" by Syracuse Castings or approved equal.

2.10 LEVEL CONTROL

- A. Provide five (5) micro float switches, single action design, capable of withstanding water penetration under 25 feet of water with at least a 3 to 1 safety factor. Floats shall be provided for the following:
 - 1. All Off
 - 2. Lead Pump On
 - 3. Lag Pump On
 - 4. High Level Alarm (wired to pump control panel)
 - 5. High Level Alarm (wired directly to the Alarm Panel)
- B. Provide integrally weighted floats:
 - 1. Do not use float switches that require pole mounting.
- C. Provide for duplex operation:
 - 1. Utilize "LEAD/LAG" principle using three float switches.
 - a. One for "LEAD" pump start.
 - b. One for "LAG" pump start.
 - c. One for a common "OFF" level.

2. Design circuitry so that operation of the "LAG" pump start circuit is not contingent on proper operation of the "LEAD" pump start circuit.
- D. Switches:
1. Micro switch sealed in a polypropylene housing with not less than 30' of cable or of adequate length to terminate in junction box below control panel without splicing.
 2. Provide polypropylene cord grips and mounting hardware for switches.
- E. Conduit seals: Provide seals suitable for Class 1, Division 1 and 2, Group D, hazardous locations.
- F. Cable holder:
1. Provide stainless steel, six hook design, Halliday Metals or equal.
 2. Mount with stainless steel anchors.

2.13 PUMP CONTROL PANEL

- A. Enclosure:
1. Provide 14 gauge Type 304 stainless steel enclosure complying with NEMA 4X, gasketed, with rain shield.
 - a. Provide free standing with leg stand kit and stainless steel anchor bolts.
 2. Provide a single 3-point locking latch.
 - a. Attach with stainless steel screws.
 3. Include removable inner swing panel fabricated of aluminum having a minimum thickness of 0.125" mounted on a continuous stainless steel piano type hinge.
 - a. Panel shall be of adequate size to completely cover all wiring and components mounted on the back panel and shall make provisions for the mounting of all basic and optional controls and instruments.
 - b. Panel shall have a minimum horizontal swing of 90° and shall be held in the closed position with straight slot screws.
 4. Provide removable back panel of 0.125" minimum thickness, aluminum, attached to enclosure on collar studs, and of adequate size to accommodate all basic and optional components.
 - a. Mount components to back panel securely utilizing screws and lockwashers.
 - b. Tap panel to accept mounting screws.
 - c. Do not use any self-tapping screws.
 5. Back panel to be painted with two coats of white epoxy enamel.
 6. Provide engraved nameplates on door-mounted hardware.
 - a. Attach with stainless steel screws.
- B. Variable Frequency Drives (2 required):
1. Power Supply
 - a. 480 volt, 3 phase, 3 wire, 60 hertz.
 - b. For operation of 10 horsepower pump.
 - c. 5% line reactor
 - d. Variable Frequency Drives Specifications
 - 1) The input power section shall utilize a full wave bridge design incorporating diode rectifiers. The diode rectifiers shall convert fixed voltage and frequency, AC line power to fixed DC voltage.

- 2) The output power section shall change fixed DC voltage to adjustable frequency AC voltage.
- 3) The adjustable frequency drive package shall include input EMI/RFI filtering.
- 4) The AC drive shall have a user interface (keypad) that presents information in plain English / Spanish / French text. The keypad shall have Run and Stop keys and a manual speed potentiometer function.
- 5) The AC Drive power converter shall be UL Plenum rated.
- 6) All heat sink fans shall be accessible from the front and shall not require the removal of the AC drive power converter for fan replacement.
- 7) All heat sink fans shall be cycled on only when required to cool the drive to maximize the life of the fan
- 8) The AC Drive shall have the an enclosure rating of IP 41 on top, IP30 sides & front IP00 on bottom, Type 1 w/ optional conduit kit
- 9) When a Type 1 conduit entrance kit is required. The kit shall attach and be ground to the bottom of the AC drive and provide conduit landing for incoming line power cables, motor lead cable, control wiring, and network cabling.
- 10) The AC Drive shall be sized to operate a variable torque load.
- 11) The speed range shall be from a minimum speed of 1.0 Hz to a maximum speed of 72 Hz.
- 12) The AC Drive shall meet IEC 60664-1 Annex A and NEMA ICS 1, UL, and CSA standards.
- 13) Environmental Rating:
 - a) The AC Drive shall be designed to operate in an ambient temperature from -10 to 50 °C (14 to 122 °F).
 - b) AC Drives in Type 1 enclosures shall be designed to operate in an ambient temperature from -10 to 40 °C (14 to 104 °F).
 - c) The storage temperature range shall be -25 to 65 °C (-13 to 149 °F).
 - d) The maximum relative humidity shall be 95%, non-condensing.
 - e) The AC Drive shall be rated to operate at altitudes less than or equal to 3300 ft (1000 m). For altitudes above 3300 ft (1000 m), the AC Drive should be de-rated per drive specifications.
 - f) The AC Drive shall meet the IEC 60721-3-3-3M3 operational vibration specification.
- 14) Ratings:
 - a) The AC Drive shall be designed to operate at the input line voltage.
 - b) The AC Drive shall operate from an input frequency range of 60 Hz (\pm) 5%.
 - c) The displacement power factor shall not be less than .98 lagging under any speed or load condition.
 - d) The efficiency of the AC Drive at 100% speed and load shall not be less than 97%.
 - e) The variable torque rated AC Drive over current capacity shall be not less than 110% for 1 minute.

- f) The output carrier frequency shall be randomly modulated about the selected frequency. The output carrier frequency of the AC Drive shall be selectable from 1 to 16 kHz, 12kHz nominal rating for 1-60 hp @ 200/240 V, 1-100 hp @ 380/480 V. Selectable: 2.5 to 8 kHz, 2.5kHz nominal rating for 75-125 hp @ 200/240 V, 125-900 hp @ 380/480 V.
- 15) Protection:
- a) Upon power-up, the AC Drive shall automatically test for valid operation of memory, loss of analog reference input, loss of communication, DC-to-DC power supply, control power and pre-charge circuit.
 - b) The AC drive shall be rated for UL minimum short circuit currents per given horsepower rating.
 - c) The AC Drive shall be protected against short circuits, between output phases and to ground.
 - d) The AC Drive shall have under-voltage power-loss ride through performance per the SEMI F-47 voltage ride through standard and certified by a third party.
 - e) The AC drive shall have a programmable ride-through function, which will allow the logic to maintain control for a minimum of one-second (60 cycles) without faulting.
 - f) An auto restart function will provide selectable time for restart attempts after the fault has disappeared and other operating conditions permit the restart. The restart shall be performed by a series of automatic attempts separated by increasingly longer periods of time. This period of time shall be selectable.
 - g) Upon loss of the analog process follower reference signal, the AC Drive shall be programmable to display a fault.
 - h) The AC Drive shall have a solid-state UL 508C listed overload protective device and meet IEC 60947.
 - i) The output frequency shall be software enabled to fold back when the motor is overloaded.
 - j) There shall be three skip frequency ranges that can be programmed to a bandwidth of 2.5 Hz.
- 16) Adjustments and Configurations
- a) The AC Drive shall be capable of storing the configuration in the keypad.
 - b) The acceleration and deceleration ramp times shall be adjustable from 0.05 to 999.9 seconds.
 - c) The memory shall retain and record run status and fault type of the past eight faults.
 - d) The software shall have an energy economy function that, when selected, will reduce the voltage to the motor when selected for variable torque loads. A constant volts/Hz ratio will be maintained during acceleration. The output voltage will then automatically adjust to meet the torque requirement of the load. Selectable volts/Hz ratio patterns does not meet specification, the function must be automatically optimized.

- e) The AC Drive shall have macro configurations for HVAC and pump applications, PID regulator set-up and network set-up.
- 17) Keypad Display Interface
 - a) A keypad display interface shall offer the modification of AC Drive adjustments through a touch keypad. All electrical values, configuration parameters, I/O assignments, application and activity function access, faults, local control, and adjustment storage, and diagnostics shall be accessible.
 - b) The AC Drive model number, torque type, software revision number, horsepower, output current, motor frequency and motor voltage shall be listed on the drive identification portion of the LCD display.
 - c) The keypad display shall have password protection that allows the keypad to be locked out from unauthorized personnel.
 - d) The keypad shall be capable of displaying I/O assignment and status.
- 18) Manufacturer: Altivar 61 manufactured by Square D Company or equal of Danfoss or ABB.
- 19) Provide all connections for control and status from/to the pump control panel.

C. Components:

- 1. Provide power disconnect on each circuit breaker with operator handle located on exterior of inner swing panel.
 - a. Include interlock permitting swing panel to be opened only when circuit breakers are in the "OFF" position.
- 2. Provide "H-O-A" switches for each motor.
 - a. Provide UL rated, heavy duty, 600 VAC, NEMA 4X, oil-tight switches, Allen Bradley Series 800H or Square D Class 9001 SK.
 - b. "Hand" position not to override motor overload shutdown.
- 3. Provide the following components with the panel:
 - a. Pilot run light for each motor.
 - b. Lockable enclosure.
 - c. Condensation heater.
 - d. Undervoltage, phase failure and phase reversal protection unit, TimeMark Model 265, or Engineer-approved equal.
 - e. High level alarm indication light.
 - f. Alarm horn silence.
 - g. Reset-motor over temperature.
 - h. GFI 20A duplex receptacle with stainless steel cover.
 - i. Weatherproof switch for flood light.
 - j. Control relays.
 - k. Remote alarm terminals.
 - l. "High temperature" indicator lamps.
 - m. "Power on" indicating lamp.
 - n. "Seal failure" indicator lamps.
 - o. 30 amp, 3P, 480 volt breaker for external TVSS.

D. Dialer contacts

1. Provide the following dry contacts in the control panel for the alarm dialer.
 - A. High Level Alarm
 - B. Pump #1 overtemp/seal failure
 - C. Pump #2 overtemp/seal failure
 - D. Power Failure.

E. Pump alternator relay:

1. Provide relay of electrical/mechanical industrial design, Series ARB, as manufactured by Diversified Electronics or equal.
2. Include three position selector switch to override automatic alternator and provide manual selection of either Pump No. 1 or No. 2 as the "LEAD" pump, Allen Bradley Series 800H or Square D Class 9001SK.

F. High temperature shutdown:

1. Provide high temperature shutdown for each motor utilizing the temperature switches embedded in the motor windings.
 - a. Under high temperature conditions switch shall open, de-energizing the motor starter and stopping the pump motor.
 - b. High motor temperature shutdown device shall be automatic reset type.

G. Moisture detector control:

1. Provide for each pump a float switch sensor that will detect moisture in the stator chamber.
2. Detection of moisture by the sensor shall disrupt the motor starting circuit of the pump involved.
3. Motor shall remain inoperative until problem is corrected and the control circuit is manually reset.

H. Provide overload reset device operable without opening the inner swing panel.

I. Provide the following components and mount on the back plate:

1. Provide a 115V control circuit transformer (open core and coil type) with primary circuit breaker and secondary circuit breakers for:
 - a. Control
 - b. Duplex receptacle
 - c. Condensation heater
 - d. Exterior GFI receptacle
 - e. 1-30A, 1P, 120V for receptacle on MTS
 - f. 1-20A, 1P, 120V for site light.
 - g. 2 spare for future equipment. (20A, 1P, 120V).
2. Provide lightning arrestor, Delta Type "LA".
 - a. Do not substitute.
3. Provide power terminals and control terminals.

- J. Design control sequence so that panel is functioning automatically again after a power failure and manual reset is not necessary.
 - 1. Provide a time delay relay to prevent both pumps from starting simultaneously after power failure.
- K. Provide a terminal board for connection of line, pump leads and level sensors.
- L. Provide elapsed time meter wired to each motor starter, six digit, non-resettable, to indicate total running time in hours and tenths.
- M. Provide high water alarm activated by micro float switch.
 - 1. Include front panel mounted silence switch.
 - 2. Provide 115V AC, utilizing standard 40-watt incandescent bulb, vapor tight, alarm light with red globe, guard and mounting hardware.
 - a. Mount on top of panel.
 - 3. Provide 115V AC, single projector, vibrating type horn with weatherproof housing, including mounting lugs and conduit tap.
 - 4. Horn and light to operate simultaneously under alarm conditions.
 - 5. Horn and light to be on at high level.
- N. Control relays: Provide heavy-duty industrial grade relays, tube base, plug-in type, Allen Bradley, Bulletin 700, Type H or Square D, Class 8501, Type K with silver cadmium oxide contacts and LED indicator.
- O. Electrical schematic:
 - 1. Provide a number indexed laminated electrical schematic diagram of the pump controls including terminal board connections.
 - 2. Permanently mount on the inside of the enclosure door.
- P. All attachment screws are to be stainless steel.
- Q. Manufacturer: Switches, pushbuttons and indicator lamps to be Allen Bradley Series 800H or Square D Class 9001 SK.
- R. Provide Air Conditioner Unit of 304 stainless steel construction. The air conditioner shall be sized to handle heat loadings from all equipment mounted inside cabinet.

2.14 WIRING

- A. Pump control panel:
 - 1. Unit to be completely factory wired except for power supply, motor, temperature switches and moisture sensor; connections; and, micro float switches.
 - a. Comply with applicable standards of National Electric Code.
 - b. Color code and number as indicated on factory wiring diagram.
 - c. Control wire to be MTW 90° C #14 AWG.
 - 2. Electrically ground all components to a common ground screw mounted on the removable back panel.

3. Neatly group all wiring in plastic wire troughs except wiring from the 14 backplate to the door shall be done in separate bundled harnesses for control circuits.
 4. Provide sufficient motor lead wiring and float control wiring to make connections in the junction box to be mounted below the control panel.
- B. Level control and motor power cable:
1. Provide cable of adequate length to terminate in control panel junction box without splicing.

PART 3 - EXECUTION

3.1 STRUCTURE

- A. Install wetwell (precast utility vault sections) complying with pertinent provisions of Section 03405 and Contract Drawings.
- B. Use base plate as a template for drilling individual hole patterns and mount base plates using 3/4" Type 316 stainless steel expansion anchors.
- C. Set up 60° slope on both sides of wetwell as indicated on Contract Drawings, using portland cement grout.
- D. Assemble the guide rails to access frame and plumb the assembly.
- E. Install float switch support to precast top using Type 316 stainless steel anchors.
- F. Install pumps and piping, plumbing assembly for proper alignment and fit.
- G. Seal around inlet and discharge piping as indicated on Contract Drawings.
- H. Install power cables using the cable strain reliefs and cord grips.

3.2 FIELD WIRING

- A. Comply with pertinent provisions of Section 16400.
- B. Extend grounding wire from control panel main ground screw to external ground as indicated and complying with NEC and local electrical codes.
- C. Mount and connect alarm light and horn if provided for remote mounting.
- D. Make motor lead, micro float switch, temperature sensor, moisture sensor, and power supply connections.
- E. Seal all conduits between junction box and control panel in accordance with the plans and complying with all pertinent National Electric Code requirements.
- F. Seal conduit terminations in control panel with duct seal.
- G. Use licensed personnel.

3.3 PUMP TESTING

- A. Provide the following inspections and tests on each pump before shipment from factory by the manufacturer:
1. Check impeller, motor rating and electrical connections for compliance to the customer's purchase order.
 2. Make a motor and cable insulation test for moisture content or insulation defects.
 3. Prior to submergence, the pump shall be run dry to establish correct rotation and mechanical integrity.
 4. Run the pump for 30 minutes submerged, a minimum of six (6') feet under water.
 5. After operational test No. 4, perform the insulation test (No. 2) again.
 6. Supply a written report stating the foregoing steps have been done with each pump at the time of shipment.
- B. Provide the following tests after installation:
1. In presence of Engineer, remove pump from structure and replace, demonstrating proper alignment and operation of mating parts.
 2. Operate pumps utilizing manual and automatic modes, demonstrating proper operational sequences including alarm conditions.
 3. Measure amperage, voltage, pumping rate and discharge pressure for each pump operating separately and for both pumps operating simultaneously.
 4. Submit six (6) copies of final test report for approval.

3.5 MEASUREMENT AND PAYMENT

- A. No separate measurement or direct payment will be made for this work and all costs for same shall be included in the price bid for the work to which it pertains.

END OF SECTION

SECTION 16400

ELECTRICAL

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Work included: Provide a complete electrical system as indicated on the Drawings, as specified herein, and as needed for a complete and proper installation including, but not necessarily limited to:
1. Main service, main breaker.
 2. Manual transfer switch.
 3. Feeder system, in conduit.
 4. Branch circuit wiring, in conduit.
 5. Wiring system, in conduit, for equipment and controls provided under other Sections of these Specifications including, but not necessarily limited to, Equipment and Mechanical Sections.
 6. Transient voltage surge suppressor.
 7. Other items and services required to complete the systems whether particularly mentioned or not.
- B. Related work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 2. Section 05990 – Miscellaneous Metals.

1.2 ABBREVIATIONS

A	Ampere (Amps)	MCA	Minimum Circuit Amps
AFF	Above Finished Floor	MCC	Motor Control Center
AFG	Above Finished Grade	MCM	1000 Circular Mils (KCMIL)
AHJ	Local Authority Having Jurisdiction	MOCP	Maximum Over-current Protection
AIC	Amps Interrupting Current	N	Neutral
AFCI	Arc-Fault Circuit Interrupter	NEC	2002 National Electrical Code
ANSI	The American National Standards Institute	NEMA	National Electrical Manufacturers Association
BF	Ballast Factor	NFPA	National Fire Protection Association
Bkr.	Breaker	NIC	Not in Contract
C	Conduit	OSHA	Occupational Safety and Health Act
Ckt.	Circuit	PF	Power Factor
CRI	Color Rendering Index	PLC	Programmable Logic Controller
CU	Copper Conductor	PVC	Polyvinyl Chloride Conduit
DETD	Dual Element Time Delay Fuse	RGSC	Rigid Galvanized Steel Conduit
Disc.	Disconnect	RMS	Root Mean Square
Dn	Down	RTU	Remote Terminal Unit
EMT	Electrical Metallic Tubing	SCADA	Supervisory Control and Data Acquisition

FLA	Full Load Amps	SCCR	Short-Circuit Current Rating
FPM	Fuse per Manufacturer Requirements	SPD	Surge Suppression Device
FS	Federal Specifications	Sym	Symmetrical
G or Gnd.	Ground	THD	Total Harmonic Distortion
GFCI	Ground-Fault Circuit Interrupter	TSP	Twisted Shielded Pair
GFP	Ground-Fault Protection	TST	Twisted Shielded Triplet
HD	Heavy Duty	TVSS	Transient Voltage Surge Suppressor
HP	Horsepower	UL	Underwriters Laboratories Inc.
IBC	International Building Code	UON	Unless Otherwise Noted
IEEE	The Institute of Electrical and Electronics Engineers	V	Volts
IMC	Intermediate Metallic Conduit	W	Watts
KVA	Kilovolt-Amps	WFC	Watertight Flexible Conduit
KW	Kilo Watt	WG	Wire Guard
KA	Kilo Amps	XFMR	Transformer
LCCF	Lamp Current Crest Factor		

1.3 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section. These shall include, but not be limited to, an electrical supervisor who is a licensed master electrician, a field foreman with a minimum journeyman electrician's license and adequate electricians and helpers.
- B. Without additional cost to the Owner, provide such other labor and materials required to complete the work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.

1.4 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 1. Materials list of items proposed to be provided under this Section.
 2. Manufacturer's specifications, other data and shop drawings needed to prove compliance with the specified requirements. Provide the following approval drawings:
 - a. Main Breaker
 - b. Conduit and fittings
 - c. Conductors
 - d. Transient Voltage Surge Suppressor
 - e. Junction box.
 - f. Special systems
 3. Manufacturer's recommended installation procedures which, when approved by the Engineer, will become the basis for accepting or rejecting actual installation procedures used on the Work.

C. Samples:

1. When so requested by the Engineer.
2. When specifically so requested by the Contractor and approved by the Engineer, approved samples will be returned to the Contractor for installation on the Work.

D. Manual: Upon completion of this portion of the Work and as a condition of its acceptance, provide operation and maintenance manuals in accordance with the provisions of Section 01650 of these Specifications. Include within each manual:

1. Copy of the approved Record Documents for this portion of the Work.
2. Copies of all warranties and guaranties.

1.5 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01640.

1.6 WARRANTY

- A. Provide standard one (1) year warranty on all labor and materials.
- B. Provide minimum five (5) year warranty on Surge Protection Devices, incorporating unlimited replacements of suppressor parts if destroyed by transients during the warranty period.
- C. Comply with Section 01650.

1.7 RULES AND PERMITS

- A. The entire installation shall be in accordance with the latest edition of the NEC, OSHA, and all local codes.
- B. Apply and pay for all permits and inspections required by local or state laws.
- C. Furnish the Owner with certificate of inspection and final approval from all authorities having jurisdiction.

1.8 DRAWINGS

- A. The drawings and specifications are complementary to each other and what is called for by one shall be as binding as if called for by both. The drawings are diagrammatic and are to be followed as closely as the construction will permit.
- B. The drawings show the general location of equipment, conduits and circuit arrangement. Because of the small scale of the drawings, it is not possible to indicate all of the detail involved. The Contractor shall carefully investigate the structural and finish conditions affecting all his Work and shall arrange such work accordingly, furnishing such fittings, junction boxes and accessories as may be required to meet such conditions.

1.9 ELECTRICAL SERVICE

- A. From the utility company, establish requirements for metering, connections, etc., and make provisions for them; providing and installing all lugs, connectors, grounding, etc., required for a complete installation.
 - 1. Coordinate work with both the electric utility company and the Owner, and schedule the installation of the service in accordance with the construction schedule such that there will be no delays in equipment startup and placing the facilities in operation.

1.10 ELECTRICAL OUTAGE

- A. Coordinate all outages with the Owner, 72 hours prior. Schedule all outages such that they will not interfere with plant operation and that there will be no delays in equipment startup and placing the facilities in operation.

PART 2 – PRODUCTS

2.1 GENERAL

- A. Provide only materials that are new, of the type and quality specified. Where Underwriters' Laboratories, Inc. have established standards for such materials, provide only materials bearing the UL label. Materials called for are to be considered as standard that, however, implies no right on the part of the Contractor to substitute other materials and methods without written authority from the Engineer.
- B. Temporary power:
 - 1. In addition to providing temporary power as described in Section 01500 of these Specifications, provide and pay the costs for installing permanent electrical meter or meters.
 - 2. When all equipment is in place and connected, and the Engineer determines the project is ready for final checkout, arrange to have the permanent metering installed in the Owner's name. At this point, the Owner will be responsible for all charges.
- C. Where any material or operation is specified by reference to published specifications or standards or the specifications or standards of any other organization; the referenced specification or standard shall be as much a part of this Section as if quoted in full herein.

2.2 RACEWAYS

- A. Applicable Standards:
 - 1. ANSI C80.1: Rigid Steel Conduits, Zinc-Coated.
 - 2. ANSI C80.3: Electrical Metallic Tubing, Zinc Coated.
 - 3. ANSI C80.5: Rigid Aluminum Conduits.
 - 4. ANSI C80.6: Intermediate Metallic Conduits.
 - 5. ANSI/NEMA FB1: Fittings and Supports for Conduit and Cable Assemblies.
 - 6. UL 6: Rigid Steel Conduit – Zinc Coated.
 - 7. UL 651-2002: Schedule 40 PVC and schedule 80 Rigid PVC Conduit.

8. UL 514B: Flexible conduit fittings.
 9. NEMA RN 1: Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
 10. NEMA FB 1: Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable.
 11. ASTM F512: Polyvinyl Chloride (PVC) Conduit.
 12. ASTM D870: Standard Practice for Testing Water Resistance of Coatings Using Water Immersion.
 13. ASTM D1151: Standard Practice for Effect of Moisture and Temperature on Adhesive Bonds.
 14. FS WW-C 581E: Federal Specification for Rigid Galvanized Steel Conduit.
 15. FS-WW-C-563A: Federal Specification for Electrical Metallic Tubing.
 16. FS-WW-C-540C: Federal Specification for Rigid Aluminum Conduit.
 17. FS WW-C 566: Federal Specification for Flexible Metal Conduit.
- B. Acceptable Manufacturers:
1. Wheatland.
 2. Allied Tube.
 3. Perma-Cote; Division of Robroy.
 4. Ocal.
 5. Carlon.
- C. Provide conduit and fittings conforming to the above standards.
- D. Rigid galvanized steel conduit and fittings – types:
1. Provide threaded type fittings and form 8 conduit bodies with material to match conduit. Provide PVC coated fittings for PVC coated rigid galvanized steel conduit installations.
 2. Provide rigid galvanized steel conduit with external 40-mil PVC coating and internal, 2-mil urethane surface.
 3. Provide seal fittings for rigid galvanized steel conduit where indicated on the plans equal to Crouse-Hinds series EYSX. Provide PVC coated seal fittings for PVC coated rigid galvanized steel conduit installations.
 4. Provide sealing compound and fiber by Crouse-Hinds or approved equal:
 - a. Sealing Compound: Chico A.
 - b. Sealing Fiber: Chico X.
 5. Provide USA manufactured base materials for PVC coated fittings, hangers, straps, etc.
- E. Provide compression type fittings and conduit bodies with matching material for electrical metallic tubing conduit.
- F. Rigid aluminum conduit:
1. Provide thread type fittings and conduit bodies with matching material.
 2. Provide standard electric conduit couplings
 - a. Do not use pipe couplings or sleeves.
 3. Provide full weight galvanized fittings.
 4. Do not imbed aluminum conduit concrete containing chlorides, unwashed beach sand, sea water, or coral bearing aggregates.

5. Isolate from other metals with heat shrink tubing (Raychem or equal) or plastic-coated hangars.
 6. Use strap wrenches for tightening aluminum conduit.
 - a. Do not use Pipe wrenches, channel locks, chain wrenches, pliers, etc.
 7. Clean and coat all threads on aluminum conduit and fittings with "No-Oxide" compound before using.
 8. Completely cover Aluminum conduit installed in concrete or below grade with two(2) coats of bitumastic paint.
 9. Terminate aluminum conduit entering manholes and below grade pullboxes with grounding type bushings and connected to a 3/4" x 10" copperclad rod with a #6 bare copper wire.
 10. All risers from underground, concrete pads, floors, etc.
 - a. Provide heat shrink tubing (Raychem or equal) from a point 1 foot-0-inch below bottom of slab or grade to a point not less than 6 inches above grade or surface of slab.
- G. Provide hot-dipped, galvanized, watertight type fittings for liquid tight flexible conduit as manufactured by O-Z/Gedney or approved equal. Provide PVC coated fittings for PVC coated rigid galvanized steel conduit installations.
- H. Conduit/Cable supports – properties:
1. Provide 316 stainless steel supports for all exposed metallic conduit as manufactured by Unistrut or approved equal.
 2. Provide fiberglass supports for all exposed non-metallic conduit/cable as manufactured by Aickinstrut or approved equal.
 3. Provide one-hole, PVC coated, malleable iron conduit straps with back spacer for all PVC coated rigid galvanized steel conduit.
 4. Provide PVC coated beam clamps with uncoated 316 stainless steel nuts and bolts for all PVC coated rigid galvanized steel conduit.
- I. All conduits to conform to the following specifications:
1. Exposed outdoor locations: Rigid aluminum conduit.
 2. Interior locations: Rigid aluminum conduit.
 3. Underground locations: Schedule 40 PVC conduit encased in concrete.

2.3 CONDUCTORS

- A. Applicable standards:
1. NEMA WC 3: Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
 2. NEMA WC 5: Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
 3. UL 44 – 2002: Rubber-Insulated Wires and Cables.
 4. UL 83 – 1999: Thermoplastic-Insulated Wires and Cables.
 5. UL 854 – 2002: Service Entrance Cables.
- B. Acceptable Manufacturers:
1. Okonite.
 2. Pirelli.

3. Southwire.
 4. Superior Essex.
 5. Belden.
- C. Conductor types:
1. Low voltage conductors (0 to 600V):
 - a. For feeders provide copper, 600V, 75°C, Type XHHW.
 - b. For all branch circuits and all other low voltage conductors, provide copper, 600V, 75°C, Type THWN.
 - c. Provide stranded conductors for sizes #12 and larger.
 - d. Provide same type of equipment grounding conductors as specified above.
 2. Splices, Connections and Terminations (0 to 600V):
 - a. For #8 AWG, use solderless pressure connectors with insulating covers for copper wire splices and taps. Use insulated spring wire connectors with plastic caps for #10 AWG and smaller.
 - b. Use insulated, mechanical connectors for copper wire splices and taps, #6AWG and larger, ILSCO or approved equal. Tape connectors with electrical tape to prevent moisture infiltration.

2.4 GROUNDING AND BONDING

- A. Applicable standards:
1. UL 467-1998: Grounding and Bonding Equipment.
 2. NFPA 70: National Electrical Code.
 3. ANSI/IEEE 32: Requirements, Terms and Test Procedures for Neutral Grounding Devices.
 4. IEEE 80: Guide for Safety in Substation Grounding.
 5. IEEE 81: Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System.
 6. NETA ATS: Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Associates).
- B. Grounding electrodes (Rod type):
1. Acceptable Manufacturers:
 - a. LTV Copperweld.
 - b. Line Material.
 2. Material: Copper-clad steel.
 3. Diameter: $\frac{3}{4}$ ".
 4. Length: 10'-0"
 5. Type: Sectional.
- C. Mechanical connectors:
1. Acceptable Manufacturers:
 - a. Burndy.
 - b. Robbins.
 - c. Harger.
 2. Material: Bronze.

- D. Exothermically-welded connections:
 - 1. Acceptable Manufacturers:
 - a. Cadweld.
- E. Grounding Electrode Conductor:
 - 1. Material: Bare, soft-drawn, stranded, copper.
 - 2. Minimum size: Meet NEC 70 requirements.
- F. Bonding Material:
 - 1. Material: Bare, soft-drawn, stranded, copper.
 - 2. Minimum size: Meet NEC 70 requirements.
- G. Regulatory requirements:
 - 1. Products: Listed and classified by UL as suitable for the purpose specified and indicated.

2.5 TRANSIENT VOLTAGE SURGE PROTECTION

- A. Applicable standards:
 - 1. UL 1449 2nd Edition - transient Voltage Surge Suppressor.
 - 2. IEEE C62.41 - IEEE Recommended Practice on Surge Voltages in Low Voltage AC Power Circuits.
 - 3. IEEE C62.45 - IEEE Guide on Surge Testing for Equipment Connected to Low-Voltage AC Power Circuits.
- B. Acceptable Manufacturers:
 - 1. Advanced Protection Technologies, Inc. (APT)
 - 2. American Power Conversion Corporation (APC)
 - 3. Innovative Technology
- C. Surge Suppression Device (SPD)
 - 1. Manufacturer's published UL 1449 Second Edition test results shall reflect SPD connected lead length of 6" or greater.
 - 2. Provide SPD devices with a minimum EMI/RFI filtering of -50dB at 100 kHz using MIL-STD-220A methodology.
 - 3. Provide a SPD unit with a short circuit current rating clearly marked and install at a point on the system where the available fault current is in excess of that rating.
 - 4. Provide SPD with one set of NO/NC dry contacts.
 - 5. Provide SPD with protection-indicating LED's that are visible without opening enclosure.
 - 6. Provide NEMA 4X SS Enclosure.
 - 7. Provide SPD that meets or exceeds the following criteria:
 - a. Maximum UL Suppression Voltage Rating (SVR) and Maximum Operating Voltage (MCOV):

SYSTEM VOLTAGE	L-N	L-G	N-G	L-L	MCOV
480/277V 3Ø	700	700	600	1200	320

2.6 ENCLOSED CIRCUIT BREAKER

- A. Provide enclosed circuit breaker as indicated on the drawings.

2.7 MANUAL TRANSFER SWITCH

- A. Rotary Manual Transfer Switch:

1. Docking Station shall have integrated Rotary Manual Transfer Switch (MTS).
 - a. MTS shall be three positions: Utility – Off - Generator.
 - b. MTS shall be located behind pad lockable door to prevent any tampering by unauthorized personnel.
 - c. MTS shall be fully rated for manual transfer under load. MTS' that require a no load manual transfer do not meet these specifications.

- B. Enclosures:

1. Surface mount, NEMA 3R rain-tight, aluminum enclosure with rake system for cable entry at the bottom.
2. Cable entry area at the bottom of the enclosure shall be covered by a hinged trap door.
 - a. It shall be possible to close and lock the front door to the enclosure with the trap door open, and power cables connected through the bottom of the enclosure. The enclosure shall maintain NEMA 3R integrity with power cables connected.
3. Front Cover:
 - a. Hinged.
 - b. Gasketed.
 - c. Pad-lockable latch.
4. Finishes:
 - a. Paint after fabrication. Powder coated Hammer Gray.

- C. Phase, Neutral, and Ground Buses:

1. Material: Silver-plated, Tin-plated or Hard-drawn copper, specified upon order.
2. Equipment Ground Bus: bonded to box.
3. Isolated Ground Bus: insulated from box.
4. Ground Bus: 25%, 50% or 100% of phase size.
5. Neutral Bus: Neutral bus rated 100 percent of phase bus.
6. Round edges on bus.

- D. Inputs connectors shall be Camlok style mounted on 45° angle plate or on gland plate.

- E. Output connectors shall be broad range set-screw type, located behind an aluminum barrier.

- F. Lockable rake system with reinforced support struts to reduce cable theft.

- G. Voltage & Phase shall be as shown on project one line drawing. Camlocks provided for incoming generator power shall be color coded as appropriate for the specified voltage.

- H. Amperage rating shall be as shown on project one line drawing.

- I. Provide one 30A L5-30 125 volt receptacle on transfer units rated 400 amps and below.

- J. Provide two 30A L5-30 125 volt receptacles on transfer units rated above 400 amps.

K. Provide unit as manufactured by Trystar or equal products by Cutler Hammer or Square D.

2.7 MISCELLANEOUS MATERIALS

- A. Provide support framing, channel and associated accessories of aluminum conforming to the Drawings and to Sections 05990 and 06800 of these specifications, except in areas containing chemicals, whereby fiberglass reinforced plastic only shall be utilized.
- B. Provide 316 stainless steel (bolts, nuts, washers, U-bolts, anchors, threaded rods, etc.) attachment hardware.

PART 3 – EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 PREPARATION

- A. Coordination:
 - 1. Coordinate as necessary with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
 - 2. Coordinate the installation of electrical items with the schedule for work of other trades to prevent unnecessary delays in the total Work.
- B. Data indicated on the Drawings and in these Specifications are as exact as could be secured, but their absolute accuracy is not warranted. The exact locations, distances, levels, and other conditions will be governed by actual construction and the Drawings and Specifications should be used only for guidance in such regard.

3.3 ELECTRICAL SERVICE

- A. Verify location of utility company secondary delivery point and report any discrepancies to the Engineer immediately.

3.4 TRENCHING AND BACKFILLING

- A. Perform trenching and backfilling associated with the work of this Section in strict accordance with the provisions of Section 02221 of these Specifications.

3.5 CONDUCTORS

- A. Install no conductor smaller than #12 AWG unless otherwise indicated.
- B. Provide copper conductors.
- C. Provide conductors as shown on the plans or as specified herein.

- D. Provide continuous wiring without joints, through pull boxes.
- E. Terminate #14 AWG stranded conductors where indicated for control, using insulated compression-type spade lugs.
- F. Terminate #12 AWG stranded conductors using insulated compression-type spade lugs.
- G. Neatly train and lace all wiring inside boxes, equipment, and panel boards.
- H. Provide phase, neutral, and ground conductors as required to accommodate metering installed. Any additional conductors required for meter to function properly shall be installed at the Contractor's expense.

3.6 COLOR CODE AND MARKERS

- A. Provide color-coding for #12 and #10 conductors as follows:

	277/480-Volt	120/208(240)-Volt
Phase "A"	Brown	Black
Phase "B"	Orange	Red
Phase "C"	Yellow	Blue
Neutral	White with Tracer	White
Ground	Green	Green

Mark all conductors #8 and larger and all feeders with plastic tape to match the above color-coding.

- B. Mark all 480-volt equipment with red laminated plastic nameplates having one-half inch (1/2") engraved lettering, reading "DANGER 480-VOLTS". Attach plate to equipment with stainless steel screws.
- C. Mark equipment, panelboards, cabinets, control devices, starters, switches, etc. by means of black, white core laminated nameplates having 1/4" engraved lettering. Provide designations as indicated on the drawings. Attach plates to equipment with stainless steel screws.

3.7 SPLICES, CONNECTIONS, AND TERMINATIONS IN 600V. CONDUCTORS

- A. Provide final connections and/or terminations for all wiring indicated on the electrical drawings and in this division of the specifications. Equipment supplied under other divisions of the specifications that require electrical connections under this division shall be provided with Engineer approved wiring and termination diagrams.
- B. Thoroughly clean wires before installing lugs and connectors.
- C. Terminate spare conductors with electrical tape

3.8 GROUNDING AND BONDING

- A. Ground and bond the electrical system and motors in accordance with Article 250 of the NEC.

- B. Install rod electrodes at locations indicated. Install additional rod electrodes as required to achieve specified resistance to ground.
- C. Provide grounding electrode conductor(s) and connect as shown on drawings.
- D. Provide separate, insulated, green equipment grounding conductor within each raceway. Terminate each end on suitable lug, bus, or bushing.
- E. Provide grounding type bushings for conduits 1" or larger and bond to ground bar or lug of enclosure.
- F. Bond neutral and ground at service entrance only.
- G. Provide exothermic-type weld grounding connections that are buried or otherwise normally inaccessible, and excepting specifically those connections for which access is required for periodic testing.
- H. Make each grounding connection strictly in accordance with the manufacturer's written instructions. Failure to follow manufacturer's written instructions shall result in immediate rejection.
- I. Welds which have "puffed up" or which show convex surfaces, indicating improper cleaning, are not acceptable. Provide grounding connection devices compatible with the conductor(s) and/or rods being joined.
- J. Maximum acceptable resistance to earth ground is 25 Ohms. Provide testing of the service entrance system ground and verify the resistance to earth ground is within the specified requirements. If the existing service entrance ground does not meet the specified requirements, install additional rod electrodes as required to achieve specified resistance to ground.

3.9 TRANSIENT VOLTAGE SURGE PROTECTION

- A. Field Installed:
 - 1. Connect SPD ground to service entrance grounding electrode conductor or to equipment grounding conductor if SPD located downstream of service entrance equipment. Confirm SPD installed per manufacturer's recommendation.
 - 2. Install SPD on the load side of the main circuit breaker.
 - 3. Install SPD in accordance with manufacturer instructions.
 - 4. Maximum lead length 12".
 - 5. Mount in NEMA 4X enclosure.

3.10 MOUNTING OF ELECTRICAL EQUIPMENT

- A. Install all equipment per the manufacturer's recommendations and the contract drawings.
- B. Provide 316 stainless steel fasteners for all installation types.
- C. Install and check all equipment in accordance with the manufacturer's recommendations.

- D. Measure and recording Megger readings phase-to-phase, phase-to-ground, and neutral-to-ground (four wire systems only).

3.11 TESTING AND INSPECTION

- A. Provide personnel and equipment, make required tests, and secure required approvals from the Engineer and governmental agencies having jurisdiction.
- B. Provide written notice to the Engineer adequately in advance of each of the following stages of construction:
 - 1. In the underground condition prior to placing concrete slab, when all associated electrical work is in place.
 - 2. When all rough-in is complete, but not covered.
 - 3. At completion of the work of this Section.
- C. When material and/or workmanship are found to not comply with the specified requirements, replace items within three days after receipt of notice at no additional cost to the Owner.

3.12 HAZARDOUS LOCATIONS

- A. Wiring and equipment in hazardous locations, as defined by the NEC, shall conform to the special requirements of the NEC, unless otherwise indicated or specified.

3.13 CLEANING AND PAINTING

- A. Collect and remove from the premises all debris, scraps and other waste material after completion of work.
- B. Tamp and level all trench work.
- C. Remove excess dirt and debris, when and as directed by the Engineer.
- D. Thoroughly clean all electrical equipment, lighting fixtures, exposed conduit, enclosures and boxes of all foreign materials and paint in accordance with Section 09900 of these Specifications unless noted or directed otherwise.
- E. Clean any exposed threaded area of raceway of cutting oil and paint with a cold galvanizing compound prior to final finish painting.

3.14 ELECTRIC EQUIPMENT BY OTHERS

- A. The equipment manufacturer shall furnish all motors for equipment.
- B. Verify voltage, dimensions, extent, type, etc. of this and all other such electrical equipment.
- C. Furnish and install all electrical supply and control equipment and material required to put all the items in proper operative condition.
- D. Refer to other sections of these specifications for verification of other equipment and devices requiring electrical connections, wiring and devices not included in this section.

- E. Refer to other drawings for details not indicated on the electrical drawings.
- F. Prior to connecting any piece of such equipment, check the nameplate data against the information shown on the drawings and call to the immediate attention of the Engineer any discrepancies discovered.

3.15 PROJECT COMPLETION

- A. Test all 600-Volt service entrance and feeder wiring using an instrument, which applies a voltage of approximately 500 volts DC to provide a direct reading of resistance.
- B. Perform test on ground system utilizing Fall-Of-Potential method. Meg grounding systems to measure ground resistance, and provide not more than 25 ohms resistance, adding ground rods as necessary to achieve that level.
- C. Conduct all tests in presence of Engineer or his representative. Identify and properly record all readings. Submit readings to Engineer for acceptance.
- D. Measure voltages as directed by the Engineer and report to him these values.
- E. Provide entire system free from all shorts and grounds.
- F. Fully comply with local and national codes for equipment bonding and grounding.
- G. Test system in the presence of the Engineer and operate to his complete satisfaction in accordance with true intent of plans and specifications. Defray cost of all adjustments necessary to bring system up to standards set forth by Contract Documents at no additional cost.
- H. Thoroughly indoctrinate the Owner's operation and maintenance personnel in the contents of the operations and maintenance manual.
- I. On the first day the facility is in operation, for at least eight (8) hours at a time directed by the Engineer, provide a qualified foreman and crew to perform such electrical work as may be required by the Engineer.

3.16 MEASUREMENT AND PAYMENT

- A. No separate measurement or direct payment will be made for this work and all costs for same shall be included in the price bid for the work to which it pertains.

END OF SECTION