

PROJECT MANUAL

FOR

THE CITY OF GEORGETOWN
SOUTH CAROLINA

PUBLIC SERVICES DEPARTMENT

US 17 & US 701 and US 17 & US 521
WATER & SEWER RELOCATIONS
UNDERGROUND UTILITY
CONVERSION

COG PROJECT # 35-2014-003
STV, INC. PROJECT #: 2516098

REV	DATE	DESCRIPTION	BY	CHK	APR
A	21JUL2014	Issued for Bids			JWH

CITY OF GEORGETOWN
120 NORTH FRASER STREET
GEORGETOWN SC 29440
(843) 545-4000

STV, INC.
2430 MALL DR., STE. 315, BLDG. B
NORTH CHARLESTON, SC 29406
(843) 207-2020

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SOUTH CAROLINA**

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21, July 2014

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(END OF SECTION)

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The drawings, 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 Section 00005 - Table of Contents

(END OF SECTION)

SECTION 00015
REFERENCES

The following reference shall be used hereinafter:

<u>Owner:</u> City of Georgetown, SC 120 North Fraser Street Georgetown, SC 29440	The City of Georgetown hereinafter will be referred to as the "Owner" and/or the "City".
<u>City Administrator:</u> Mr. Chris Carter 120 North Fraser Street Georgetown, SC 29440	Mr. Chris Carter hereinafter will be referred to as the "City Administrator".
<u>Purchasing Agent:</u> Mrs. Bonnie Infinger 120 North Fraser Street Georgetown, SC 29440	Mrs. Bonnie Infinger hereinafter will be referred to as the "Purchasing Agent".
<u>Project Manager:</u> Mr. Jonathan Heald, P.E. 2377 Maybank Dr Georgetown, SC 29442	Mr. Jonathan Heald hereinafter will be referred to as the "Project Manager".
<u>Project Manager UG Conversion:</u> Mr. Alan Loveless, P.E. 800 Church Street Georgetown, SC 29442	Mr. Alan Loveless hereinafter will be referred to as the "Project Manager for the Underground Utility Conversion".
<u>Engineer:</u> STV, Inc. 2430 Mall Dr., Ste. 315, Bldg. B North Charleston, SC 29406	STV, Inc hereinafter will be referred to as the "Engineer".

(END OF SECTION)

SECTION 00020
ADVERTISEMENT FOR BIDS

The City of Georgetown (hereinafter called the “Owner” and/or the “City”) requests separate sealed bids from qualified contractors for the US 17 & US 701 AND US 17 & US 521 WATER AND SEWER RELOCATIONS AND UNDERGROUND UTILITY CONVERSION in the City of Georgetown, SC. The scope of work for this project is described in the complete Bid Documents.

Sealed bids will be received by the City at City Hall – Purchasing Department, 120 North Fraser Street, Georgetown, SC 29440 until **Wednesday, August 21, 2014 @ 2:00 PM** and at said office will be publicly opened and read aloud.

Electronic copies of the Contract Documents may be obtained from the following locations:

- City of Georgetown <http://www.cogsc.com>

Physical copies of the Contract Documents may be obtained from the address listed below.

City of Georgetown – Water Administration
2377 Anthuan Maybank Dr
Georgetown, SC 29442

Reproduction and shipping costs, if any, will be paid directly by the Contractor to City and are non-refundable.

Each bid must be accompanied by a certified check of the Bidder, or by Bid Bond made payable to the City, for an amount equal to not less than five percent (5%) of the total bid as a guarantee that, if the bid is accepted, the required Agreement will be executed and that a one hundred and ten percent (110%) Performance Bond and a one hundred percent (100%) Payment Bond will be furnished.

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

All bidders shall be legally qualified under the provisions of the South Carolina Contractor’s Licensing Law, Chapter 11, Sections 40-11-05 through 40-11-440 of the South Carolina Code of Laws as amended. Any bid submitted by a bidder who does not meet these requirements shall be rejected.

The City reserves the right to waive any informality in bidding and to reject any or all bids if it is in City’s best interest to do so. Unless all bids are rejected, award will be to the low responsive,

US 17/701 & US17/521
Water & Sewer Relocation & UG Utility Conversion
21 July, 2014

CITY OF GEORGETOWN
SOUTH CAROLINA
REVISION A

responsible Bidder.

The City of Georgetown is an equal opportunity/ affirmative action employer.

No Bidder may withdraw the bid within sixty (60) days after the actual date of the opening and thereof.

These bid documents will be modified only by written addenda.

(END OF SECTION)

00100
INFORMATION FOR
BIDDERS

1. PROJECT DETAIL

Generally and without force or effect on the Contract requirements, the Work consists of the installation of water and sewer mains and the installation of power and telecommunication conduits and power cabinets as generally described in the “Summary” Section and as more fully described in the complete Bid Documents.

2. RECEIPT AND OPENING OF BIDS

The City of Georgetown (hereinafter called the “Owner”) invites bids on the form (s) attached hereto, all blanks of which must be appropriately filled in. Bids will be received by the Owner at the City Hall – Purchasing Department office at 120 North Fraser Street until **Wednesday, August 27, 2014 @ 2:00 PM** at which time said bids will be publicly opened and read aloud. The envelopes containing the bids and bid bonds must be sealed and addressed to:

Mrs. Bonnie Infinger
City of Georgetown
120 North Fraser Street
Georgetown, S.C. 29440

and designated as Bid for:

US 17 & US 701 AND US 17 & US 521 WATER AND SEWER RELOCATIONS
AND UNDERGROUND UTILITY CONVERSION;
COG PROJECT # 35-2014-003, STV PROJECT # 2516098

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 sixty (60) days after the actual date of the opening thereof.

3. PREPARATION OF BID

Each bid must be submitted on the prescribed form. All blank spaces for bid prices must be filled in with ink or typewritten.

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.

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.

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, Bidder'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.

4. SUBCONTRACTS

The bidder is 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.

5. TELEGRAPHIC MODIFICATION

Any bidder may modify its 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 (2) days from the closing time, no consideration will be given to the telegraphic or facsimile modification.

6. QUALIFICATION OF BIDDER

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.

7. BID SECURITY

Each bid must be accompanied by cash, certified check of the bidder, or a bid bond prepared on the form of bid bond attached hereto, duly executed by the bidder as principal and having as surety thereon a surety company approved by the Owner, in the amount of five percent (5%) of the bid. Cash or checks will be returned to all except the three (3) lowest bidders within three (3) days after the opening of bids, and

the remaining cash or checks will be returned promptly after the Owner and the accepted bidder have executed the contract, or, if no award has been made within sixty (60) 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.

8. LIQUIDATED DAMAGES FOR FAILURE TO ENTER INTO CONTRACT

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.

9. TIME OF COMPLETION AND LIQUIDATED DAMAGES

Bidder must agree to commence work on or before a date to be specified in a written "Notice to Proceed" of the Owner and to fully complete the project within the number of consecutive calendar days thereafter as indicated on the Bid Form. Bidder must agree also to pay as liquidated damages the sum indicated on the Bid Form for each consecutive calendar day thereafter as hereinafter provided in General Conditions.

10. CONDITIONS OF WORK

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 and means as will not cause any interruption of, or interference with, the work of any other contractor.

11. ADDENDA AND INTERPRETATIONS

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 and addressed to the Project Manager. To be given consideration, the request must be received at least five (5) 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 which, if issued, will be posted on the City's website no later than three (3) days prior to the date fixed for the opening of bids. It shall be the bidder's responsibility to check for addenda before issuing its bid. Failure of any bidder to receive any addendum shall not relieve the bidder from any obligation under its bid as submitted. All addenda so issued shall become part of the contract documents.

12. SECURITY FOR FAITHFUL PERFORMANCE

Simultaneously with bidder's delivery of the executed contract, the Contractor shall

furnish a surety bond or bonds as secured 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

13. POWER OF ATTORNEY

Attorneys-in-fact who sign bonds or contract bonds must file with each bond a certified and effectively dated copy of their power of attorney.

14. NOTICE OF SPECIAL CONDITIONS

Attention is particularly called to those parts of the contract documents and specifications which deal with the following:

- A. Insurance requirements

15. LAWS AND REGULATIONS

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.

16. METHOD OF AWARD - LOWEST QUALIFIED BIDDER

If at the time this contract is to be awarded, the lowest base bid or alternate 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 or alternate bid. 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 alternates 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:

- A. Maintains a permanent place of business.
- B. Has successfully complete other work with the City
- C. Has adequate plant equipment and personnel to perform the work properly and expeditiously.
- D. Has suitable financial status to meet obligations incident to the work.
- E. Has appropriate technical experience.

17. RIGHT TO INCREASE OR DECREASE THE AMOUNT OF WORK

The work comprises approximately the quantities shown in the bid form which will be used as a basis for comparison of Bids and not for final estimate. The Owner does not, by expression or by implication, agree that the actual amount of work shall correspond with the estimated quantities. The Owner reserves the right to increase or decrease the

amount of work under the Contract of the work contemplated, at the unit prices quoted in the Bid.

18. OBLIGATION OF BIDDER

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. If a site visit is required, contact the Project Manager to schedule a date and time. 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.

20. Bidders must also make positive efforts to use small and minority-owned business and to offer employment, training and contracting opportunities in accordance with Section 3 of the Housing and Urban Development Act of 1968. Attention of bidders is particularly called to the requirements as to conditions of employment to be observed and minimum wage rates to be paid under the contract.

(END OF SECTION)

SECTION 00110
CONTRACTOR'S AND SUBCONTRACTOR'S
INSURANCE REQUIREMENTS

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 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 US 17 & US 701 AND US 17 & US 521 WATER AND SEWER RELOCATIONS AND UNDERGROUND UTILITY CONVERSION and the PROJECT NUMBER(S), COG PROJECT # 34-2014-003, STV PROJECT # 2516098.
4. Additional Insured: The Commercial General Liability and Excess Liability (Umbrella) insurance policies shall be endorsed to include the Owner as additional insured.
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 not be 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)	\$ 50,000.00

1. The General Aggregate listed above shall be for this project only.
2. Special Hazards: The Contractor's and his Subcontractors 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 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 area in which Federal Flood Insurance is available.

G. Owner's Protective Liability Insurance: The Contractor shall purchase and maintain an Owner's Protective Liability policy issued in the name of the Owners with a combined single limit of liability of not less than the following:

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

(END OF SECTION)

SECTION 00311
BID FORM

US 17 & US 701 AND US 17 & US 521 WATER AND SEWER RELOCATIONS
AND UNDERGROUND UTILITY CONVERSION
FOR THE
THE CITY OF GEORGETOWN
SOUTH CAROLINA

Georgetown, S.C.

Date: _____

PROPOSAL OF _____

(hereinafter called "Bidder"), a _____(State)

corporation/partnership/individual (Strike out inapplicable terms) doing business as

TO: Mrs. Bonnie Infinger
City of Georgetown

Gentlemen:

The Bidder, in compliance with your invitation for bids for the US 17 & US 701 AND US 17 & US 521 WATER AND SEWER RELOCATIONS AND UNDERGROUND UTILITY CONVERSION having examined the drawings 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, and to construct the project in accordance with the Contract Documents, within the time set forth therein, for the Lump Sum of:

_____ Dollars (\$ _____)

The lump sum price indicated above shall include all labor, materials, overhead, profit, insurance, taxes, fees, etc., to cover all expenses incurred in performing the work required under the Contract Documents, of which this proposal is a part.

The lump sum price indicated above shall also include the amounts indicted as Allowances and as described in the Division 1 Section "Allowances". Should actual cost vary from the Allowance listed, The Contract Sum shall be adjusted by Change Order.

Bidder hereby agrees to commence work under this contract on or before a date to be specified in written "Notice to Proceed" of the Owner and to fully complete the project within ninety (90) 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 00700.1.

The 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 between any of the above is discovered by the contractor, the problem shall be referred to the Owner as soon as possible for resolution by the Owner. 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:

No.: _____ Dated: _____

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

The Bidder agrees that this Bid shall be good and may not be withdrawn for a period of sixty (60) calendar days after the scheduled closed time for receiving bids.

SCHEDULE OF UNIT PRICES

Additions and deletions from the Work shall be paid in accordance with the Unit Prices indicated below.

Item Number	Description	Estimated Quantity	Unit	Unit Cost	Total Cost
Item 1	WATER MAIN - DUCTILE IRON PIPE (PUSH-ON)				
a.	8-inch (Class 350)	0	L.F.		
b.	12-inch (Class 350)	384	L.F.		
Item 2	WATER MAIN - DUCTILE IRON PIPE (RESTRAINED JOINT)				
a.	8-inch (Class 350)	50	L.F.		
b.	10-inch (Class 350)	30	L.F.		
c.	12-inch (Class 350)	1,118	L.F.		
Item 3	DUCTILE IRON FITTINGS				
a.	Paid by Weight	3	Tons		
Item 4	VALVES				
a.	8-inch Gate Valve	0	EA		
b.	12-inch Gate Valve	7	EA		
c.	8-inch Tapping Sleeve and Valve	1	EA		
d.	10-inch Tapping Sleeve and Valve	2	EA		
Item 5	FIRE HYDRANTS	4			
a.	Fire Hydrant - Complete Assembly	4	EA		
b.	Remove Existing Hydrant	3	EA		
Item 6	ROAD CROSSINGS - STEEL CASING				
a.	16-Inch Casing (Installed by open cut)	0	L.F.		
b.	18-Inch Casing (Installed by open cut)	242	L.F.		
Item 7	WATER CONNECTIONS				
a.	Service lateral (Short Side)	7	EA		
b.	Service Lateral (Road Crossing - Includes encasing the service in 2-inch Sch 80 PVC pipe while under the roadway)	5	EA		
c.	Connect new 8" water main to existing 8" stub out	1	EA		
Item 8	SEWER MAIN				
a.	8-inch: 0' - 9' Cut (Ductile Iron - Class 350)	367	L.F.		
b.	8-inch: 0' - 9' Cut (Ductile Iron - Class 53 & Restrained Joint)	637	L.F.		
c.	8-inch: 0' - 9' Cut (PVC)	843	L.F.		
Item 9	PRECAST CONCRETE MANHOLES				
a.	4-Foot Diameter Manhole Base (includes base, 4-vertical feet, top, ring, and cover)	10	EA		
b.	4-Foot Diameter Doghouse Manhole Base (includes base, 4-vertical feet, top, ring, and cover)	1	EA		
c.	4-Foot Diameter Manhole Base (with 1 - outside drop, 1 - inside drop, 1 - 5-lf 8" stub out, base, 4-vertical feet, top, ring, and cover)	1	EA		
d.	4-Foot Diameter Manhole Riser	27	VF		
Item 10	SEWER CONNECTIONS				
a.	Connection to existing manhole with 8-inch Pipe	1	EA		
b.	Service Lateral (to existing cleanout)	19	EA		
c.	Reroute Service for TitleMax to MH C-3	1	L.S.		

d.	Install 10-inch bell restraint harness on existing pipe	6	EA		
e.	Connect New 8" Gravity Sewer to Existing 8" Clay Gravity Sewer Main	1	EA		
f.	Connect Existing 8" Gravity Sewer to New Manhole (at MH D-3)	1	L.S.		
g.	Reconnect existing 6-inch Force Main on Bond St. to Existing MH #1578 (Includes flowable filling the approx. 635-lf of 6" force main being abandoned, approx. 10-lf of 6-inch PVC piping, bend(s), connecting the force main into the manhole, and all incidentals required to make a complete and functioning connection that meets the City's technical specifications for a force main connection to a manhole.)	1	L.S.		
h.	Rework Existing Storm drain Conflict box for new 8" gravity Sewer Main Servicing McDonald's	1	L.S.		
Item 11	PAVEMENT REMOVAL AND REPLACEMENT				
a.	Remove and Replace Pavement (Road Replacement)	0	S.Y.		
b.	Repave Highmarket outside of road project area	1	L.S.		
c.	Flowable Fill (In open trench or pit)	5	C.Y.		
d.	Select Backfill (In open trench or pit and compacted to 95%)	20	C.Y.		
Item 12	DEMOLITION AND ABANDONMENT				
a.	Remove frame and cover, fracture base and sides, and fill manhole w/ flowable fill	9	EA		
b.	Remove Existing Manhole from New Sewer's Trench	5	EA		
c.	Remove Existing Gravity Sewer from New Gravity Sewer's Trench	703	L.F.		
d.	Remove Existing Manhole and fill with flowable fill	1	EA		
e.	Flowable Fill - Abandoned Sewer Mains	23	C.Y.		
f.	Flowable Fill - Abandoned Water Mains	22	C.Y.		
Item 13	BYPASS PUMPING				
a.	Gravity Sewer	1	L.S.		
Item 14	PAVEMENT REMOVAL AND REPLACEMENT				
a.	Concrete Driveway	22	S.Y.		
b.	Sidewalk	225	S.Y.		
c.	Asphalt Pavement	744	S.Y.		
Item 15	EROSION CONTROL				
a.	Silt Fence	145	L.F.		
b.	TYPE F - Weighted Inlet Tubes	15	EA		
Item 16	CLEAN UP, DISINFECTION, AND TESTING				
a.	All Size Water Mains	1,582	L.F.		
b.	All Size Gravity Sewer Mains	1,847	L.F.		
Item 16	UNDERGROUND UTILITY CONVERSION				
a.	City of Georgetown Sectionalizing Cabinet (Installation Only)	3	EA		
b.	6" HDPE Utility Conduit (1 st conduit by directional drill)	250	L.F.		
c.	6" HDPE Utility Conduit (2 nd and more conduits in same directional drill operation)	2,000	L.F.		
d.	6" PVC Utility Conduit (1 st conduit by open cut)	100	L.F.		
e.	6" PVC Utility Conduit (2 nd and more conduits in same cut)	700	L.F.		

f.	4" HDPE Utility Conduit (2 nd and more conduits in same directional drill operation)	500	L.F.		
g.	4" PVC Utility Conduit (1 st conduit by open cut)	700	L.F.		
h.	4" PVC Utility Conduit (2 nd and more conduits in same cut)	2,500	L.F.		
i.	2" Utility Conduit supplied by 3 rd party (install only as 2 nd or more conduits in directional drill operation)	1,000	L.F.		
j.	2" PVC Utility Conduit (1 st conduit by open cut)	350	L.F.		
k.	2" PVC Utility Conduit (2 nd and more conduits in same cut)	2,300	L.F.		
l.	2" Utility Conduit supplied by 3 rd party (install only as 2 nd and more conduits in same cut)	3,600	L.F.		
m.	1.5" PVC Utility Conduit (1 st conduit by open cut)	1,500	L.F.		
n.	1.25" HDPE Utility Conduit (2 nd and more conduits in directional drill operation)	750	L.F.		
o.	1.25" PVC Utility Conduit (2 nd and more conduits in same cut)	3,500	L.F.		
p.	Standard street light junction boxes for future lighting	11	EA		
q.	Concrete Encasement (3,000 PSI Minimum)	3	C.Y.		
r.	Miscellaneous Construction items (moving items, landscape restoration, trees, concrete bollards, etc)	1	L.S.		
Item 16	TRAFFIC CONTROL				
a.	Traffic Control	1	L.S.		

The above Unit Prices shall include all labor, materials, overhead, profit, insurance, taxes, fees, etc., to cover the finished work called for. All Unit Prices for utility conduits shall include sweeps, bends, couplings, caps, fittings, etc., which shall be included in the unit price per linear foot. See Section 00313 for Underground Utility Conversion Schedule of Values and bidding instructions.

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

The Bidder agrees that this Bid shall be good and may not be withdrawn for a period of sixty (60) consecutive calendar days after the scheduled closed time for receiving bids

The undersigned declares that his firm is (delete those not applicable):

A corporation organized and existing under the laws of the

State of _____.

A partnership consisting of

_____.

The undersigned declares that the person or persons signing this proposal is fully authorized to

sign the proposal on behalf of the firm listed and to fully bind the firm listed to all the conditions and provisions thereof.

It is agreed that no person or persons or company other than the firm listed below or as otherwise indicated hereinafter has any interest whatsoever in this proposal or the contract that may be entered into as a result thereof, and that in all respects the proposal is legal and fair, submitted in good faith, without collusion or fraud.

Respectfully Submitted:

Contractor

(SEAL – if bid is by a Corporation)

By: _____

(Type/Print Name)

(Title)

(Street Address)

(City, State, Zip Code)

S.C. General Contractor's License No. _____

FID No. _____ and/or SSN _____

(END OF SECTION)

SECTION 00350
BID BOND

KNOW ALL MEN BY THESE PRESENT:

That we, the undersigned _____, as Principal,
and _____, as Surety, are hereby held and
firmly bound unto the **City of Georgetown, South Carolina**, as Owner, in the penal sum of
_____ Dollars _____ 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 _____ a certain Bid,
attached hereby and by reference made a part hereof, to enter into a contract in writing for the
_____.

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 attached 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 an 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)

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)

SECTION 00500
CONTRACT

STATE OF SOUTH CAROLINA

COUNTY OF GEORGETOWN

THIS AGREEMENT, entered into this ____ day of _____, 20____ and effective immediately by and between _____, doing business as a (individual/partnership/corporation), with its principal office in the City of _____, _____ County, ____ (State) _____, (hereinafter called the "Contractor") and the City of Georgetown, a duly organized and validly existing body politic of the State of South Carolina (hereinafter called "City"),

WITNESSETH THAT WHEREAS, The City desires to engage the services of a professional contractor for the purpose of _____, hereinafter referred to as "Project"; and,

WHEREAS, The City has solicited bids for same by that certain Request for Bids for Construction Services, hereinafter referred to as "RFB", a copy of which is attached hereto for all purposes as **EXHIBIT "1"**; and,

WHEREAS, The Contractor has represented to City that it has the qualifications, experience, expertise, training, and personnel to timely perform the Project for City; and,

WHEREAS, The Contractor has expressed its desire to do so by their bid, dated _____, 20____, hereinafter referred to as "Bid", a copy of which is attached hereto for all purposes as **EXHIBIT "2"**; and,

WHEREAS, the parties desire to enter in an agreement for the Contractor to perform the Project for City per all the terms and conditions more particularly set out herein below;

NOW, THEREFORE, for and in consideration of the foregoing, and of other good and valuable consideration, the adequacy of which is hereby acknowledged, the parties hereto agree as follows:

(1) **SCOPE OF SERVICES:**

- a. Contractor hereby agrees to perform the tasks and services as outlined in the Project Manual, incorporated into this Agreement as **ATTACHMENT "A"** and hereinafter referred to as "Work";
- b. Contractor further agrees to commence and complete any and all extra work in connection therewith, under the terms as stated in the General and Special Conditions of the Contract; and at his/hers (its or their) own proper cost and expense to furnish all the materials, supplies, machinery, equipment, tools, superintendents, labor, insurance, and other accessories and services necessary to complete the said project in accordance with the conditions and prices stated in the Proposal and the General Conditions, Supplemental General Conditions, and Special Provisions of the Contract, the plans, including all maps, plats, blueprints, and other drawings and printed or written explanatory matters thereof, the specifications and contract documents therefore as prepared by the Engineer, and as enumerated in Paragraph 1 of the General Conditions, all of which are made a part hereof and collectively evidence and constitute the Contract.
- c. City may, from time to time require changes in the Work of the Contractor to be performed hereunder. Such changes, which are mutually agreed upon by and between City and the Contractor, shall be incorporated by written amendment to this Agreement.

(2) **COMPENSATION:**

- a. City agrees to pay Contractor a sum not to exceed _____ dollars (\$_____.__) in accordance with the Schedule of Values, incorporated into this Agreement as **ATTACHMENT "B"** and hereinafter referred to as "Compensation";
- b. In the event funds are not appropriated or become non-appropriated for an included fiscal year by City, it is agreed by the parties that this Agreement will become null and void and the City's obligations cannot extend beyond the date of non-appropriation.

(3) **PERIOD OF SERVICES:**

- a. the Work to be performed hereunder by the Contractor shall begin upon the date outlined to the City's Notice to Proceed letter to the Contractor, incorporated into this Agreement as **ATTACHMENT "C"** and hereinafter referred to as "NTP"
- b. The Work shall be completed in accordance with the Schedule, incorporated into this Agreement as **ATTACHMENT "D"** and hereinafter referred to as "Schedule".
- c. Modifications to the Schedule may be required. Such modifications, which are mutually agreed upon by and between City and the Contractor shall be incorporated by written amendment to this Agreement.

(4) **FORCE MAJEURE:**

- a. Force majeure includes acts of God, acts of other branches of government in either their sovereign or contractual capacities, or any similar cause beyond the reasonable control of the parties.
- b. Any delays in or failure of performance by either party that are caused by a Force Majeure shall not constitute breach of this Agreement.
- c. In the event that any event of force majeure, as herein defined occurs, both parties shall be entitled to a reasonable extension of time for performance of its WORK.

(5) **NOTICES:**

- a. Any notices, bills, invoices, or reports required by this Agreement shall be sufficient if sent by the parties in the United States mail, postage paid, to the addresses of the Project Manager (See Section 00015)

(6) **RECORDS AND INSPECTIONS:**

- a. Contractor shall maintain full and accurate records with respect to all matters covered under this Agreement for a period of one year after the completion of the project.
- b. City shall have free access at all proper times to such records, and the right to examine and audit the same and to make transcripts there from, and to inspect all program data, documents, proceedings, and activities.

(7) **COMPLETENESS OF AGREEMENT:**

- a. This Agreement and any additional or supplementary document or documents incorporated herein by specific reference contain all the terms and conditions agreed upon by the parties hereto, and no other agreements, oral or otherwise, regarding the subject matter of this Agreement or any part thereof shall have any validity or bind any of the parties hereto
- b. This Agreement is entered into with full understanding and awareness of such requirement.
- c. City shall be allowed to rely upon the representations of Contractor as set out in the Proposal.
- d. With the exception of the foregoing, this Agreement constitutes the entire agreement between the parties hereto and may not be modified or amended except in writing signed by both parties hereto.

(8) **CONFLICTS:**

- a. In the case of any conflict between the terms and conditions of this Agreement and the terms of any other agreement between the parties hereto, the terms of this Agreement shall control
- b. If there is a conflict between the City's Proposal and this Agreement, then this Agreement shall control.
- c. If there is a conflict between the City's Request for Bids and the Contractor's Proposal, the City's Request for Bids shall control.
- d. Both parties agree that all conflicts arising under this Agreement that cannot be settled between the parties shall be resolved in the Georgetown County Court of Common Pleas (Non-Jury)

(9) **SEVERABILITY:**

- a. If any part or provision of this Agreement is held invalid or unenforceable under applicable law, such invalidity or unenforceability shall not in any way affect the validity or enforceability of the remaining parts and provisions of this Agreement.

(10) **NONWAIVER:**

- a. The waiver by City or Contractor of a breach of this Agreement shall not operate as a waiver of any subsequent breach, and no delay in acting with regard to any breach of this Agreement shall be construed to be a waiver of the breach.
- b. In no event shall the making of any payment by City to the Contractor constitute or be construed as a waiver by City of any breach of covenant, or any default which may exist on the part of the Contractor.
- c. The making of any such payment by City while any such breach or default shall exist in no way impairs or prejudices any right or remedy available to City in respect to such breach or default.

(11) **GOVERNING LAW:**

- a. This Agreement and the rights, obligations and remedies of the parties hereto, shall in all respects be governed by and construed in accordance with the laws of the State of South Carolina.

(12) **RESPONSIBILITY:**

- a. Each party shall be responsible for its own acts as provided under the law of South Carolina and will be responsible for all damages, costs, fees and expenses which arise out of the performance of this Agreement which are due to that party's own negligence, tortious acts and other unlawful conduct and the negligence, tortious action and other unlawful conduct of its respective agents, officers and employees.

(13) **FREEDOM OF INFORMATION ACT (FOIA)**

- a. The parties acknowledge that all documents are subject to release under the South Carolina Freedom of Information Act (FOIA) and will be released to the public unless exempt from disclosure under the FOIA.
- b. If the Contractor contends a document is exempt from disclosure under the FOIA, it shall mark any such documents plainly, and seek protection from disclosure by filing an

appropriate action in Circuit Court and shall bear the cost of the action and any monetary or attorney's fees awarded to the person or entity making the FOIA request.

- c. If the Contractor objects to release and litigation is commenced against the City under the FOIA, the City agrees to promptly notify the Contractor, who shall move in intervene as a party. The Contractor agrees to hold the City harmless from and indemnify for all costs (including plaintiff's attorney's fees if awarded by the Court) incurred by the City in defending the lawsuit and the funds necessary to satisfy any judgment and all costs on appeal, if any.

(14) **THIRD PARTY OBLIGATIONS:**

- a. Neither party shall be obligated or liable hereunder to any party other than the second party to this Agreement.

(15) **RESTRICTIONS ON LOBBYING:**

- a. Contractor shall comply with all requirements of Section 1352, Title 31 of the U.S. Code, which prohibits all recipients of federal funds from using appropriated monies for lobbying activities.

(16) **SUCCESSORS AND ASSIGNS:**

- a. The rights and obligations herein shall inure to and be binding upon the successors and assigns of the parties hereto.

US 17/701 & US17/521
Water & Sewer Relocation & UG Utility Conversion
21 July, 2014

CITY OF GEORGETOWN
SOUTH CAROLINA
REVISION A

IN WITNESS WHEREOF, City and the Contractor have executed this agreement as of the date first written above.

CITY OF GEORGETOWN, SOUTH CAROLINA
(OWNER)

(SIGNATURE)

By: _____

(SEAL)

Title: _____

(CONTRACTOR)

(SIGNATURE)

By: _____

(CORPORATE SEAL)

Title: _____

Attest:

It's Secretary

Witness

(END OF SECTION)

CONTRACT
00500-7

SECTION 00500.1
PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS THAT

(NAME OF CONTRACTOR)

(ADDRESS OF CONTRACTOR)

a Corporation Partnership , hereinafter called Principal, and

(NAME OF SURETY)

(ADDRESS OF SURETY)

hereinafter called Surety, are held and firmly bound unto

THE CITY OF GEORGETOWN, SOUTH CAROLINA
(NAME OF OWNER)

120 NORTH FRASER STREET, GEORGETOWN, SC 49440
(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 present.

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 part hereof for US 17 & US 701 AND US 17 & US
521 WATER AND SEWER RELOCATIONS AND UNDERGROUND UTILITY
CONVERSION.

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 of 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)

(SIGNATURE)

As to Principal

By: _____

Title: _____

(SURETY)

(SIGNATURE)

As to Surety

By: _____

ATTORNEY-IN-FACT
(Power of Attorney to be attached)

By: _____
(RESIDENT AGENT)

(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)

SECTION 00501.1
PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS THAT

(NAME OF CONTRACTOR)

(ADDRESS OF CONTRACTOR)

a Corporation Partnership , hereinafter called Principal, and

(NAME OF SURETY)

(ADDRESS OF SURETY)

hereinafter called Surety, are held and firmly bound unto

THE CITY OF GEORGETOWN, SOUTH CAROLINA
(NAME OF OWNER)

120 NORTH FRASER STREET, GEORGETOWN, SC 49440
(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 present.

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 part hereof for US 17 & US 701 AND US 17 & US
521 WATER AND SEWER RELOCATIONS AND UNDERGROUND UTILITY
CONVERSION.

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 of 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:

(PRINCIPAL - CONTRACTOR)

(SIGNATURE)

As to Principal

By: _____

Title: _____

(SURETY)

(SIGNATURE)

As to Surety

By: _____

ATTORNEY-IN-FACT
(Power of Attorney to be attached)

By: _____
(RESIDENT AGENT)

(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)

SECTION 00502.3
NOTICE OF INTENT TO AWARD

OWNER: City of Georgetown, SC

PROJECT: US 17 & US 701 AND US 17 & US 521 WATER AND SEWER RELOCATIONS
AND UNDERGROUND UTILITY CONVERSION

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 WITH ALTERNATE(S): \$ _____

The Owner has determined that the above named Bidder is responsible and has submitted the winning bid. The Owner may enter into a contract with this Bidder subject to the contract review by _____.

(Print or Type Name)

(Award Authority Title)

(Signature)

(Date Posted)

(END OF SECTION)

SECTION 00502.4
NOTICE OF AWARD

TO:

PROJECT DESCRIPTION: US 17 & US 701 AND US 17 & US 521 WATER AND SEWER
RELOCATIONS AND UNDERGROUND UTILITY CONVERSION

The Owner has considered the bid dated _____ 20____, 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 _____ day of _____, 20____.

CITY OF GEORGETOWN, SOUTH CAROLINA

By: _____

Title: _____

Acceptance of Notice

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

(Signature)

By: _____

Title: _____

**US 17/701 & US17/521
Water & Sewer Relocation & UG Utility Conversion
21 July, 2014**

**CITY OF GEORGETOWN
SOUTH CAROLINA
REVISION A**

(END OF SECTION)

**NOTICE OF AWARD
00502.4-2**

SECTION 00600
EMPLOYMENT ELIGIBILITY VERIFICATION REQUIREMENT

- A. Contractor is required to comply with all applicable State and Federal employment eligibility verification requirements including but not limited to the following:
1. By signing its bid or proposal, Contractor certifies that it will comply with the applicable requirements of Title 41, Chapter 8 of the South Carolina Code of Laws and agrees to provide to the City of Georgetown upon request any documentation required to establish either: (a) that Title 41, Chapter 8 is inapplicable both to Contractor and its subcontractors or sub-subcontractors are in compliance with Title 41, Chapter 8. Pursuant to Section 41-8-70, "In addition to other penalties provided by law, a person who knowingly makes or files any false, fictitious, or fraudulent document, statement, or report pursuant to this chapter is guilty of a felony, and upon conviction, must be fined within the discretion of the court or imprisoned for not more than five years, or both. "Contractor agrees to include in any contracts with its subcontractors language requiring its subcontractors to (a) comply with the applicable requirement of Title 41, Chapter 8, and (b) include in their contracts with the sub-subcontractors language requiring the sub-subcontractors to comply with the applicable requirements of Title 41, Chapter 8.
- B. Contractor is required to complete and submit the attached affidavit along with the executed contract documents.
- C. E-Verify.
1. In addition to completing and maintaining the federal employment eligibility verification form (Form I-9), Contractor must, within three (3) business days after employing a new employee, verify the employee's work authorization through the E-Verify federal work authorization program administered by the U.S. Department of Homeland Security. Employers may no longer confirm a new employee's employment authorization with a driver's license or state identification card.
 2. Contractor shall enroll in E-Verify at www.dhs.gov/e-verify.

**CONTRACTOR AFFIDAVIT
SOUTH CAROLINA ILLEGAL IMMIGRATION REFORM ACT (Amended)**

In accordance with the requirements of the South Carolina Illegal Immigration Reform Act, Contractor hereby certifies that it is currently in compliance with the requirements of Title 40, Chapter 8 of the S.C. Code Annotated and will remain in compliance with such requirements throughout the term of its contract with the Owner.

The Contractor hereby acknowledges that in order to comply with requirements of S.C. Code Annotated Section 41-8-20:

- (A) All private employers in South Carolina shall be imputed a South Carolina employment license, which permits a private employer to employ a person in this State. A private employer may not employ a person unless the private employer's South Carolina employment license and any other applicable licenses as defined in Section 41-8-10 are in effect and are not suspended or revoked. A private employer's employment license shall remain in effect provided the private employer complies with the provisions of this chapter.
- (B) All private employers who are required by federal law to complete and maintain federal employment eligibility verification forms or documents must register and participate in the E-Verify federal work authorization program, or its successor, to verify the work authorization of every new employee within three business days after employing a new employee. A private employer who does not comply with the requirements of this subsection violates the private employer's licenses.
- (C) The South Carolina Department of Employment and Workforce shall provide private employers with technical advice and electronic access to the E-Verify federal work authorization program's website for the sole purpose of registering and participating in the program.
- (D) Private employers shall employ provisionally a new employee until the new employee's work authorization has been verified pursuant to this section. A private employer shall submit a new employee's name and information for verification even if the new employee's employment is terminated less than three business days after becoming employed. If a new employee's work authorization is not verified by the federal work authorization program, a private employer must not employ, continue to employ, or reemploy the new employee.
- (E) To assist private employers in understanding the requirements of this chapter, the director shall send written notice of the requirements of this section to all South

Carolina employers, and shall publish the information contained in the notice on its website. Nothing in this section shall create a legal requirement that any private employer receive actual notice of the requirements of this chapter through written notice from the director, nor create any legal defense for failure to receive notice.

- (F) If a private employer is a contractor, the private employer shall maintain the contact phone numbers of all subcontractors and sub-subcontractors performing services for the private employer. The private employer shall provide the contact phone numbers or a contact phone number, as applicable, to the director pursuant to an audit or investigation within seventy-two hours of the director's request.

The Contractor agrees to provide to the Owner upon request any documentation required to establish the applicability of the South Carolina Illegal Immigration Reform Act (Amended) to the contractor, subcontractor or sub-subcontractor. The Contractor further agrees that it will upon request provide the Owner with any documentation required to establish that the Contractor and any subcontractors or sub-subcontractors are in compliance with the requirements of Title 41, Chapter 8 of the S.C. Code Annotated.

Date: _____

(Signature)

By: _____

Title: _____

(END OF SECTION)

SECTION 606
NOTICE TO PROCEED

TO: _____

PROJECT DESCRIPTION: US 17 & US 701 AND US 17 & US 521 WATER AND SEWER
RELOCATIONS AND UNDERGROUND UTILITY CONVERSION

OWNER: City of Georgetown, South Carolina

PROJECT NUMBER: _____

This is your Notice to Proceed with the Work, on the above-mention Project, in accordance with the Agreement dated _____ 20____. You are authorized to commence work on _____ 20____, and you are required to complete the Work within _____ (_____) consecutive calendar days thereafter.

The date of final completion for all Work is therefore: _____ 20____.

You are required to return an acknowledged copy of this Notice to Proceed to the Owner.

Dated this _____ day of _____, 20____.

CITY OF GEORGETOWN, SOUTH CAROLINA

(Signature)

By: _____

Title: _____

Acceptance of Notice

Receipt of the above Notice to Proceed is hereby acknowledged this the _____ day of _____, 20____.

(Signature)

By: _____

Title: _____

(END OF SECTION)

SECTION 610
 APPLICATION FOR PAYMENT

TO: CITY OF GEORGETOWN, SC

PAY REQUEST NO.: _____

FROM: _____

Distribution to:

VIA: _____

_____ Owner

_____ Engineer

_____ Contractor

PROJECT: _____

PROJECT NO.: _____

DATE : _____

CONTRACT FOR: _____

CONTRACTOR'S APPLICATION FOR PAYMENT

CHANGE ORDER SUMMARY			
Change Orders approved in previous months by Owner		ADDITIONS	DEDUCTIONS
TOTALS:			
Approved this Month			
Number	Date Approved		
TOTALS:			
Net changes by Change Order			

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

CONTRACTOR:

By: _____

Date: _____

Application for Payment, as indicated below, in connection with the Contract.
 (Continuation Sheet is attached)

1 – ORIGINAL CONTRACT SUM	\$
2 – Net changes by CHANGE ORGERS	\$
3 – CONTRACT SUM TO DATE (Line 1 + Line 2)	\$
4 – TOTAL COMPLETED AND STORED TO DATE (“G” on Continuation Sheet)	\$
5 – RETAINAGE (“I” on Continuation Sheet)	\$
6 – TOTAL EARNED LESS RETAINAGE (Line 4 – Line 5)	\$
7 – LESS PREVIOUS CERTIFICATES FOR PAYMENT	\$
8 – CURRENT PAYMENT DUE	\$
9 – BALANCE TO FINISH, PLUS RETAINAGE (Line 3 – Line 5)	\$

State of: _____ County of: _____
 Subscribed and sworn to before me this _____ day of _____ 20__ .
 Notary Public: _____ My Commission Expires: _____

CONTRACTOR’S APPLICATION FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising the above application, the Engineer certifies to the Owner that to the best of the Engineer's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED. Some defects or problems with construction items may not be determined until final testing and operation of the system is performed. The Engineer cannot be held liable for approval for partial payments for the installation of these items from which the evidence of defects or problems were not determined until after the request for payment was approved.

AMOUNT CERTIFIED \$ _____
 (Attach explanation if amount certified differs from amount applied for.)

ENGINEER:

By: _____ Date: _____

OWNER:

By: _____ Date: _____

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

SECTION 00620
CONTRACTOR'S AFFIDAVIT

The State of _____ Date: _____
The County of _____ The City of _____
_____ of _____
(Officer's Name) (Officer's Title) (Contractor's Name)

being duly sworn, deposed and says that _____ has furnished
(Contractor's Name)
labor and materials entering into the _____
(Project Name)
dated _____ with the City of Georgetown, South Carolina.

_____ states further that this officer has full knowledge of all
(Contractor's Name)
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 Owner, the City of Georgetown
(Contractor's Name)
South Carolina, 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:

(Officer's Name)
I, _____, Notary Public in and for the above named County and
State do hereby certify that _____ personally know to me to be the
(Officer's Name)
affiant in the foregoing Affidavit, personally appeared before me this day and, having been duly
sworn, deposed and says 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 _____
My Commission Expires: _____

SECTION 00630
CONTRACT CHANGE ORDER

DATE: _____ PROJECT: _____
CHANGE ORDER #: _____ PROJECT # : _____

Description of and Reason for Change: _____

Itemization of Proposed Change and Basis for Payment

Original Contract Price \$ _____
Previous Change Orders \$ _____
This Change, (An Addition) (A Deduction) of \$ _____
Proposed Revised Contract Price \$ _____

Additional funds shall be provided in the following manner: _____

Extension of Contract Time Required: _____ days.

Revised Contract Completion Date: _____

Accepted by the Contractor:

By: _____ Date: _____

Recommended:

By: _____ Date: _____

Approved by the Owner:

By: _____ Date: _____

SECTION 00700.1
GENERAL CONDITIONS

1. CONTRACT AND CONTRACT DOCUMENTS. The drawings (plans), specifications and addenda, hereinafter enumerated in Section 00005, 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.

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

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 City 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 City, unless otherwise expressly stated.

- 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 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

- A. 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.
 - B. 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.
 - C. 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
 - D. Contractor's Records. Where a Shop Drawing or sample submission is required by the Specifications, no related work shall be commenced until the submission has been approved by the 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.
 - E. 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, superintendent, 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 Owner. The cost of such inspection and testing shall be paid by the Contractor.
- A. 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.
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, 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 obligated 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:
- A. Construction staking shall be the responsibility of the Contractor.
 - B. Laws and Regulations. The Contractor shall keep himself fully informed of all laws, ordinances, and regulations of the 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, ordinance, 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 workman-like 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 Contractor shall replace or make good any such damage, loss, or injury. 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. 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 and 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 (15%) 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.
 - 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, and tornadoes.
 - 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 with 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, in a timely manner, 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 ten (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 ten (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 ten (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 of 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
- A. Construction Schedule. 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.
 - B. Contractor's Estimate. The Contractor shall also furnish:
 - 1. A detailed estimate, giving a complete breakdown of the contract price; and;
 - 2. 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.
 - C. Materials and 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. PAYMENT TO CONTRACTOR shall be made according to the following:
- A. No later than thirty (30) days after the City's Engineer approves the request for payment. The Owner shall make a progress payment to the Contractor on the basis of a duly certified approved estimate of the work performed during the preceding calendar month under this contract. The City requires that checks are to be mailed by USPS to the contractor. To insure the proper performance of this contract, the Owner will retain a portion of each estimate until final completion and acceptance of all work covered by this contract in accordance with the following:

1. Retention of up to 10% of payment claimed until construction is complete, or as follows:
 2. After construction is 50% complete, 10% of the 50% completion portion will be retained and no additional retainage will be withheld, provided that the contractor is making satisfactory progress and there is no specific cause for greater withholding.
 3. When the project is substantially complete (operational or beneficial occupancy), the retained amount may be further reduced to only that amount necessary to assure completion.
 4. The Owner will accept a cash bond or irrevocable letter of credit if offered in lieu of cash retainage under (2), and will accept a cash bond or irrevocable letter of credit if offered in lieu of cash retainage under (3).
 5. The Owner may reinstate up to 10% retainage if the Owner determines, at its discretion, that the contractor is not making satisfactory progress or there is other specific cause for such retainage.
- 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 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 worked, or as a waiver of the right of the Owner to require the fulfillment of all the terms of the contract.
- D. 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, material, men, 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 compiled with:
- A. Final Inspection. Upon notice from the Contractor that their work is completed, the Engineer will make a final inspection of the work and shall notify the Contractor of all instances where their work fails to comply with the 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 specifications and to satisfaction of the Engineer.
 - B. Operating Test. After the alterations for compliance with the 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 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 damages 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 of 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 any- one 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
- A. Limits of Liability. Insurance shall be obtained for not less than the limits of liability as specified in Section 00110 entitled INSURANCE REQUIREMENTS.
 - B. Certificates of Insurance. The Contractor shall furnish the Owner certificates shown in the type, amount, class of operations covered, effective dates, and dates of expiration of the policies. Certificates showing proof of such insurance shall be submitted to the Owner prior to commencement of services under this Agreement. Such certificates shall contain substantially the following statement: "The insurance covered by this certificate will not be canceled or materially altered except after ten (10) days written notice has been received by the Owner". Further, it shall be an affirmative obligation upon the Contractor to advise the City's Risk Manager within two days of the cancellation or substantive

30. CONTRACT SECURITY. The Contractor shall furnish a one hundred and ten (110) percent performance bond and a one hundred (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 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 sub-contractor 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 which 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 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 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 questions 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 questions.
- A. 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, which 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. N/A
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. To make arrangements with adjacent property owners for parking of equipment if necessary.
 - 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 or 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. RIGHTS-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 (1) 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

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 sealed, postage prepaid envelope, and the receipt thereof is acknowledged by the Contractor.
 - A. Owner's Notice. All papers required to be delivered to the Owner shall be delivered as indicated in Section 00015 entitled REFERENCES.
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. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
 - A. All persons on the Site or who may be affected by the Work:
 - B. All the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - C. Other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property. All damage, injury, or loss to any property caused, directly or indirectly, in whole or in part,

by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or Engineer's Consultant, or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them). Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

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.
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 sub- contract 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 may be 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
- A. 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 therefrom; and is caused in whole or in part by any negligent or willful act of omission of the Contractor and Sub-Contractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.

- B. 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 Sub-Contractor, 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 benefit acts.

(END OF SECTION)

US 17/701 & US17/521
Water & Sewer Relocation & UG Utility Conversion
21 July, 2014

CITY OF GEORGETOWN
SOUTH CAROLINA
REVISION A

SECTION 00800
SUPPLEMENTAL GENERAL CONDITIONS

US 17/701 & US17/521
Water & Sewer Relocation & UG Utility Conversion
21 July, 2014

CITY OF GEORGETOWN
SOUTH CAROLINA
REVISION A

(END OF SECTION)

SECTION 00900
DRAWING INDEX

-----	COVER
CG 1.01	STANDARD DETAILS, LEGEND, & ABBREVIATIONS
CE 1.01	EROSION CONTROL DETAILS
CU 1.01	HIGHMARKET ST. – GRAVITY SEWER
CU 1.02	N. FRASER ST. & DUKE ST. – GRAVITY SEWER
CU 1.03	BOND ST. – GRAVITY SEWER
CU 1.04	MCDONALD’S – GRAVITY SEWER PROFILE
CU 2.01A	N. FRASER ST. – WATER MAIN - PLAN
CU 2.01B	N. FRASER ST. – WATER MAIN - PROFILE
CU 2.02	HIGHMARKET ST. – WATER MAIN
CCI	COVER SHEET
CC2-CC3	CONDUIT CONSTRUCTION PLAN
CD1-CD2	CONDUIT CONSTRUCTION DETAILS

(END OF SECTION)

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 facility from coordinates established by the Engineer.
 - 2. Establish proper line and levels for installation of utilities.
- 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. These include but are not limited to the following:
- C. Work by others:
 - 1. Not less than one (1) benchmark elevations will be provided.

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.

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 the 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 Contractors.
- 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, USDA Rural Development, Environmental Protection Agency, Department of Natural Resources 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-residents 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/she 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. (Refer to 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 (SC DHEC), and 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 facility with the Owner and the Engineer to assure the least amount of interruption possible to the operation of the facility.
 3. Make no connections to the existing facility diverting flow to the new facility until directed by the Engineer.

END OF SECTION

SECTION 01061
PERMITS AND RIGHTS-OF-WAY

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Work Included: This section established requirements pertaining to the securing and payment for licenses, building permits, right-of-way, etc. necessary for the construction of the project.
- B. Work Not Include: Owner will obtain and provide to the Contractor, as required, copies of the following:
 - 1. South Carolina Department of Transportation Encroachment Permit for work in the State Right-of-Way
 - 2. South Carolina Department of Health and Environmental Control-Permit to Construct Water/Wastewater Facilities
 - 3. Office of Ocean and Coastal Resource Management Certification
- 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. Additional requirements for field engineering also may be described in other Sections of these Specifications. These include but are not limited to the following:
 - a) None

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 permits required, whether of temporary or permanent nature.

3.2 BUILDING PERMITS

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

3.3 RIGHT-OF-WAY, EASEMENTS

- A. Owner will provide necessary rights-of-way or easements for construction of utility lines, roads and sidewalks whether on privately or publicly owned property
- B. The Contractor shall confine their activities to the provided rights-of way and/or easements
- C. The Owner will provide no other rights-of way and/or easements over the property.

3.4 LAND

- A. Owner will provide necessary land for construction of treatment facilities, lift stations, pump stations, parks and buildings, whether on privately or publicly owned property

END OF SECTION

REFERENCED 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
GSA	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

REFERENCED STANDARDS

CONTRACTOR/SUBCONTRACTOR QUALIFICATIONS

PART 1 – GENERAL

The following information and completed forms may be requested by the Owner of the three lowest bidders. The request will be made within five (5) days following the bid opening. Requested data to be received by the Owner within ten (10) 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. Any Subcontractor used by the General Contractor whose portion of this project exceeds 5% of the total bid 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 Contractors of America from "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: _____

CONTRACTOR/SUBCONTRACTOR QUALIFICATIONS

C. List and describe a minimum of five (5) previous projects of similar size and nature completed in the last ten (10) years. (Attach additional sheets, if necessary):

1. _____

2. _____

3. _____

4. _____

5. _____

D. List Owner, contact and telephone number for each of the five (5) 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), foreman 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 statues of job and estimate 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 (15) years (Attach additional sheets, if necessary):

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

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

3. Project Name: _____
Project Manager: (Engineer's) _____
Original Construction Price: _____
Final Construction Price: _____

Specified Completion Time: _____
Actual Completion Time: _____
Explanation: _____

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

5. Project Name: _____
Project Manager: (Engineer's) _____
Original Construction 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.

P. Additional information:

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 (Print)

(Seal)

Title

Date

Notary Public of South 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/she wishes.

1.4 PRECONSTRUCTION CONFERENCE

- A. The Conference is not required but is recommended and 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 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 the 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 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 meeting will be held at the City of Georgetown – Water Utilities and Engineering Department.

2377 Anthuan Maybank Drive
Georgetown, SC 29440

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. Revision 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 challenged 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 DISCRIPTION

- 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 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 Contract 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 and 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 prepare 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 Par 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. Shall 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 correct 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. Un-required 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 or submittal and submittal date.
2. Construction schedule.
3. Schedule of partial payment request.

- 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 include data not pertinent to the submittal, clearly show which portions of the contents are being submitted for review.
 - a. Cross out or strikethrough all data not pertinent to the submittal.
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.
 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, when 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 to 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 (Contractor) and approved with respect to the means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incidental thereto. (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 re-submittals, 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 re-submittals, and for placing orders and securing delivery.
- B. In scheduling, allow at least twenty-five (25) 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, re-submittal shall be within ninety (90) days of the review shown on the Engineer’s shop drawing review stamp.
- B. For submittals marked “Revise and Re-Submit”, “Submit Specified Item”, or “Rejected”, re-submittal shall be within thirty (30) days of the review data 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 to 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 items functions.
- F. Revisions:
 - 1. Make revisions required by the Engineer.
 - 2. If the Contractor considers any required revision to be a change, he/shell 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 Re-submit” or “Rejected” and which are re-submitted 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

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

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

END OF SECTION

SECTION 01500
TEMPORARY FACILITIES

PART 1 – GENERAL

1.1. DESCRIPTION

A. Work included: Provide temporary facilities needed for the work including, but not necessarily limited to:

1. Temporary utilities such as heat, water and electricity.
2. Field office for the Contractor's personnel.
3. Sanitary facilities.

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. Permanent installation and hookup of the various utility lines are described in other Sections.

1.2. PRODUCT HANDLING

A. Maintain temporary facilities in proper and safe condition throughout progress of the work.

PART 2 – PRODUCTS

2.1. UTILITIES

A. Water:

1. Provide necessary temporary piping and water supply and, upon completion of the work, remove such temporary facilities.
2. The Owner shall provide water used in construction. The Contractor shall obtain a construction meter from the Owner.

B. Electricity:

1. Provide necessary temporary wiring and, upon completion of the work remove such temporary facility.
2. Provide and pay for electricity used in construction.

C. Heating: Provide and maintain heat necessary for proper conduction of operations needed in the work.

2.2. FACILITIES

A. Contractor's facilities:

1. Provide a field office building and sheds adequate in size and accommodation for Contractor's offices, supply and storage.
2. Locate only at sites approved by Engineer.
3. Maintain surroundings in a sanitary and satisfactory manner.

B. Sanitary facilities:

1. Provide temporary sanitary facilities in the quantity required for use by all personnel.
2. Maintain in a sanitary condition at all times.
3. Strictly enforce their use.

2.3. PROJECT SIGNS

A. Not required.

PART 3 – EXECUTION

3.1. MAINTENANCE AND REMOVAL

- A. Maintain temporary facilities and controls as long as needed for safe and proper completion of the work.
- B. Remove such temporary facilities and controls as rapidly as progress of the work will permit, or as directed by the Engineer.

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. MANUFACTURE'S RECOMMENDATIONS

A. Except as otherwise approved by the Engineer, determine and comply with manufacture'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 manufacture, 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 manufacturer's 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 or completion.

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION (NOT APPLICABLE)

END OF SECTION

PRODUCT HANDLING
01640-2

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. Contractors Affidavit.

1.2. SUBSTANTIAL COMPLETION

- A. The Contractor shall notify the Engineer that, in his/her 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. Contractors Affidavit.

1.6. FINAL PAYMENT

A. Final payment to the Contractor will be made upon completion of 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. Additional requirements for field engineering also may be described in other Sections of these Specifications. These include but are not limited to the following:

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 all 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 JOB SET DOCUMENTS

- 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, manholes, valves, wyes locations, etc.
 - 3. Reference all fittings and valves at least to two above ground 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. Show location of electrical conduit, pull boxes, etc.
 9. Gravity sewers and storm sewers
 - a. Provide survey grade state plane Geographic Information System (G.I.S.) electronic data horizontal coordinates for each structure location.
 - b. Provide ground elevation, top elevation and invert elevations for each structure.
 - c. Comply with Section 01050.1
- D. Submittals:
1. Submit “marked-up” set of drawings to the Engineer
 2. Make any necessary additions as required by the Engineer

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 - Sewers: Sanitary, Gravity.
 - 3. Section 02726 - Rehabilitation of Existing Sewers Utilizing Pipe – Bursting.
 - 4. Section 02729 - Rehabilitation of Existing Sewers Utilizing Cured-in-Place Pipe.
 - 5. Section 02730 - Rehabilitation of Existing Manholes.

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. Locate these and other possible unknown utility lines using electronic pipe finder, or other approved means.
 - 3. Locate, excavate and expose all existing underground lines in advance of trenching operations.
 - 4. 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.
 - 5. 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.

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 (Unclassified)

A. Remove all materials of whatever substance encountered.

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.

TRENCHING, BACKFILLING FOR UTILITIES

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.
- 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.
 - 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
- 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 MEASUREMENT AND PAYMENT

- A. Unclassified excavation for trenching:
1. No 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 utility line to which it pertains.

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

CONTROLLED DENSITY FILL
02225-2

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 #57 crushed stone for project entrance and exit.
- B. Provide #57 crushed stone for temporary sediment barriers around inlets and for temporary stone check dams.

2.2 GRASSING

- A. Comply with Section 02930 - Grassing.

2.3 SILT FENCE

- A. All posts to be self-fastener angle steel, 5' in length.
 - 1. Wooden posts are not acceptable.
- B. Woven wire shall conform to the requirements of ASTM A 116, 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.
- C. Provide filter fabric meeting the requirements of the South Carolina Department of Health and Environmental Control (SCDHEC), complying with the most current edition of the SCDOT Standard Specifications for Highway Construction and appearing on the SCDOT Approved Materials Sheet #34.
 - 1. Limit splices in filter fabric using continuous rolls whenever possible.
 - 2. 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 fence is not compromised.
 - 3. Securely attach filter fabric to top of woven wire and at posts with wire ties.

- D. 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.

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 that will remain unstabilized for a period of more than 30 days in accordance with Section 02930.
- 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 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 and clean or otherwise remove silt buildup as necessary once a week or 24-hours following a rain event of ≥ 0.1 ".

3.6 REMOVAL

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

3.7 MEASUREMENT AND PAYMENT

- A. All work under this Section will be measured and paid for as specified hereinafter.
- B. No measurement or direct payment will be made for temporary grassing.
- C. Silt fencing will be measured and paid for at the unit price per linear foot as stated in the Bid Form and shall include the costs for excavation, materials, installation, maintenance, removal and backfill.
- D. Maintenance cost for the erosion control devices utilized shall be included in the unit price bid for the item to which it pertains.

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 02225 - Controlled Density Fill (flowable fill).
 - 4. Section 02722 - Sewers: Sanitary, Gravity.
 - 5. Section 02726 - Rehabilitation of Existing Sewers Utilizing Pipe – Bursting.
 - 6. Section 02729 - Rehabilitation of Existing Sewers Utilizing Cured-in-Place Pipe.
 - 7. Section 02730 - Rehabilitation of Existing Manholes.

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 remove and replace 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.

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 and latest revisions and supplements.

2.3 AGGREGATE BASE COURSE WITH PRIME

- A. Comply with applicable portions of South Carolina Department of Transportation Standard Specifications, Section 305, Macadam Base Course, and latest revisions and supplements.

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 4000 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 4000 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. Backfill with controlled density (flowable fill) in accordance with Section 02225 with 2" depression.
 - 2. 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 2" of asphaltic concrete.
4. Taper resurfacing to existing pavement evenly for a distance of 50 feet beyond repaired area.

3.4 MEASUREMENT AND PAYMENT

A. Ditch line replacements:

1. Length will be measured along center line of the utility from center to center of manholes or fittings.
2. No measurement of width will be made.
3. Payment will be made at the unit price per linear foot stated in the Bid Form.

B. Resurfacing:

1. Length will be measured from end to end of the resurfaced area.
2. Width will be measured as the average width.
3. Area will be determined from length and width measurements.
4. Payment will be made at the unit price per square yard as stated in the Bid Form.

C. Concrete sidewalks:

1. Payment will be made at the unit price per Linear Foot as stated in the Bid Form.

END OF SECTION

SECTION 02516

DISINFECTION OF POTABLE WATER LINES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide disinfection of potable water 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 the Special Provisions, General Specifications, and Sections in Division 1 of these specifications.
 - 2. Section 02751 – Tank Piping, Valves, and Appurtenances.

1.2 REFERENCES

- A. American Water Works Association (AWWA):
 - 1. C-651: Disinfecting Water Mains.
 - 2. B-300: Standard for Hypochlorites.

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.
- B. All work shall comply with South Carolina Department of Health and Environmental Control (SCDHEC) State Primary Drinking Water Regulations.
- C. All work shall conform to provisions of AWWA C-651 for water line distribution.
 - 1. Do not use Tablet Method or Slug Method therein.

1.4 SUBMITTALS

- A. Comply with pertinent provisions of Section 01340.
- B. Submit chlorination and dechlorination plan to Engineer thirty (30) days before chlorination and dechlorination.
- C. Submit flushing plan to Engineer.

PART 2 - PRODUCTS

2.1 DISINFECTANT

- A. Sodium Hypochlorite complying with AWWA B-300.
- B. Calcium Hypochlorite granules and tablets complying with AWWA B-300. Calcium hypochlorite intended for use in swimming pools is not permitted.
- C. Disinfection with pure chlorine gas is not permitted.

2.2 DECHLORINATION (NEUTRALIZING) AGENTS

- A. Liquid sulfur dioxide or sulfite solution
- B. Sulfur dioxide gas is not permitted.

2.3 TEST KITS

- A. High Range Test Kit for Chlorine Residual (0 - 200 mg/l): Provide Hach Chemical Company Model CN-21P.
- B. DPD Chlorine Residual Test Kit (0 – 3.5 mg/l): Provide Hach Chemical Company Model CN-66.

2.4 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 GENERAL

- A. Upon completion of testing, disinfect all water lines to meet requirements of AWWA C-651 and the SCDHEC.
 - 1. Utilize the Continuous Feed Method.
- B. Newly laid valves or other appurtenances shall be operated several times while line is filled with chlorinating agent.
- C. Should initial treatment fail to meet results specified, repeat procedures until satisfactory results are obtained, at no additional cost to the Owner.
- D. All pipe taps, feeders, chemicals, etc. for sterilization shall be provided by the Contractor.
- E. Perform hydrostatic testing of water main prior to disinfection.

3.2 DISCHARGE REQUIREMENTS

- A. Discharges to the environment:
 - 1. Discharges shall not cause or have the reasonable potential to cause or contribute to a violation of a SCDHEC water quality standard.
 - 2. Utilize Best Management Practices (BMPs) to prevent erosion from discharge of water during any construction activities including flushing and disinfection.
- B. Notify the Engineer immediately in the event of any accidental discharge.

3.3 PRELIMINARY FLUSHING

- A. Prior to chlorination, fill water main with clear water to eliminate air pockets and flush to remove foreign materials that might have entered the main during installation or repair.

- B. Provide flushing of sufficient magnitude and duration to flush all foreign material out of the lines, valves, and hydrants.
- C. Provide a minimum flushing velocity of 2.5 feet per second (FPS). Required flow and openings required to produce proper flushing velocity of forty (40) PSI are:

Pipe Size (Inches)	Flow (GPM) at 2.5 FPS	Hydrant Openings
4	100	1 - 2-1/2"
6	200	1 - 2-1/2"
8	400	1 - 2-1/2"
10	600	1 - 2-1/2"
12	900	1 - 2-1/2"

- D. All valves and hydrants to be fully opened and closed under water pressure to ensure proper operations during flushing and to dislodge foreign material.
- E. All valves or connections to existing distribution system to be closed and backflow preventer or other approved equipment installed at the source during flushing operations to prevent contamination of existing distribution system.
- F. Provide protection of existing site improvements during flushing operation.
- G. For water mains twenty-four (24) inches and larger, an acceptable alternative to flushing is to broom-sweep the main.
 - 1. Remove sweepings prior to chlorinating the main.

3.4 DISINFECTION OF WATER MAINS

- A. Provide water supplied from a temporary, backflow-protected connection to the existing distribution system at a constant measured rate into the new water main.
 - 1. In absence of a meter, determine the flow rate either by placing a pilot gauge at discharge or by measuring the time to fill a container of known volume.
- B. Inject water entering the new main with a chlorine solution fed at a constant rate. Chlorine solution feed rate to provide and maintain a free chlorine concentration of no less than fifty (50) milligrams per liter (mg/L) during the filling of the water main.
 - 1. Injection point to be no more than ten (10) feet downstream from the beginning of the new water main.
 - 2. Measure chlorine concentration at regular intervals utilizing high-range chlorine test kits to ensure the minimum chlorine concentration is provided.
 - 3. Chlorine solutions may be prepared with sodium hypochlorite or calcium hypochlorite. The amount of chlorine required for each one hundred (100) feet of pipe to produce a fifty (50) mg/L concentration is:

Pipe Size (Inches)	100% Chlorine (LB)	1% Chlorine Solution (gal)
4	0.013	0.16
6	0.030	0.37
8	0.054	0.65
10	0.085	1.02
12	0.122	1.47

4. Feed chlorine solution until the entire main is filled with chlorinated water with a minimum concentration of fifty (50) mg/L.
5. Provide a gasoline or electrically powered chemical-feed pump designed for feed chlorine solutions to feed hypochlorite solutions.
 - a. Provide feed lines made of material capable of withstanding the corrosion caused by concentrated chlorine solutions and the maximum pressures that may be caused by the feed pumps.
 - b. Check all connections for tightness before the chlorine solution is applied to the main.
- C. Retain the chlorinated water in the water main for a minimum of twenty-four (24) hours.
 1. Operate valves and hydrants in the treated section of the water main during the twenty-four (24) hours period to ensure disinfection of appurtenances.
- D. At end of the twenty-four (24) hour retention period, all sample locations shall have a residual of not less than ten (10) mg/L of free chlorine.
- E. Final flushing: After the retention period, flush the chlorinated water from the water main, valves, and branches until the chlorine residual is less than 0.5 mg/L.
 1. Provide dechlorination of the chlorinated water in the main by applying a dechlorination agent.

3.5 SAMPLING PROGRAM AND ACCEPTANCE

- A. After final flushing, provide two separate samples for each sample location, taken at twenty-four (24) hour intervals, free of coliform bacteria.
 1. Contractor to take 1st and 2nd samples, deliver to SCDHEC approved laboratory for testing.
 2. The 1st and 2nd sample results shall include the free chlorine residual at the time the samples were collected.
 3. Notify SCDHEC to take a 3rd sample.
- B. At a minimum, sample locations shall be as required by SCDHEC and the following:
 1. The tie-in location of new and existing water lines.
 2. The end of all dead end lines.
 3. At intervals of no more than 1,200' for all new lines longer than 1,200' in length.
- C. All sample locations are to be given an identifying label and a corresponding identification label is to be included on the record drawings indicating each sample location.
- D. Provide all results to the Engineer.
- E. Resampling: If the initial disinfection fails to produce satisfactory bacteriological results or if other water quality is affected, reflush the water main and resample.
- F. Redisinfection: If the check samples fail to produce acceptable results, repeat disinfection procedures until satisfactory results are obtained.

3.6 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 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 02615 - Removing and Replacing Pavements.
 - 4. Section 02726 - Rehabilitation of Existing Sewers Utilizing Pipe-Bursting.
 - 5. Section 02729 - Rehabilitation of Existing Sewers Utilizing Cured-In-Place Pipe.
 - 6. Section 02730 - Rehabilitation of Existing Manholes.
 - 7. Section 02930 - Grassing.
 - 8. Section 11307 - Temporary Bypass Pumping System.

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 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 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, then 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. On all open-cut mainline sewer replacement, the same size pipe shall be installed at the same slope as the existing pipe being replaced.
- B. Ductile-iron pipe and fittings (DIP) (for depths 14' or greater):
 - 1. Comply with ANSI/AWWA C151/21.51, latest revision.
 - 2. Wall thickness in accordance with Table 51.1 of ANSI/AWWA C151/A21.51 with working pressure of 150 psi, depth of cover indicated and Type 3 bedding conditions, minimum Class 52.
 - 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. Provide 250 psi rated ductile iron fittings or specials unless otherwise indicated, complying with ANSI/AWWA C110/A21.10 and in accordance with ANSI/AWWA C111/A21.11.
 - 7. Clearly cast the manufacturer's mark, country where cast, year in which the fitting was produced, and the letters "DI" or "Ductile" on the fitting."
 - 8. 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.
 - 9. Polyethylene encasement:
 - a. Provide polyethylene encasement of pipe where indicated on the plans and where controlled density fill is utilized.
 - b. Minimum nominal thickness of 8 mils. $\pm 10\%$.
- 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.
 - 4. Transition Adapter PVC to DIP:
 - a. For transition between ductile iron pipe and PVC pipe use ductile iron adapter with Protecto 401 lining by Romac Industries, Inc. Model 501 Transition Coupling or approved equal.
 - b. Fasteners to be Type 316 stainless steel.

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. Provide tongue and groove with O-ring rubber gasketed joints.
6. 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.
7. The following chart indicates minimum manhole diameters for sanitary sewers entering/exiting a manhole:

Pipe Size (in.)	Manhole Diameter (in.)
8-21	48

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".
10. Epoxy lining:
 - a. Comply with Section 09811.
11. Provide manhole sealant using the inorganic copolymer waterproofing admixture "Ipanex" by IPA Systems in accordance with the Manufacturer's dosage and mixing instructions or an approved equal method.

B. Steps:

1. Provide manholes without steps.

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 22" and 24".
11. Provide circular cover with two "pick" holes, one 1" diameter vent hole, and weighing not less than 130 lbs.
12. Covers to have the words "CITY OF GEORGETOWN" cast in the metal.
13. Coat frames and covers with two (2) shop coats of water based bitumastic paint, MC4 MPFC by Molecular Coating Specialist of Cedar Hill, Texas or approved equal.
14. 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.
15. Provide East Jordan Iron Works, Inc. Catalogue Number 1020 or 1022 frames and 1020A covers or approved equal.

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 USF 7621 or approved equal.
 3. Provide brass plugs on all cleanouts.
 4. Coat with 2 shop coats of bitumastic paint.
 5. 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. Double service shall be a minimum of 6" trunk and 4" branches.
 6. Comply with the latest adopted version of the International Plumbing Code or local codes where applicable.
 7. 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.

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- 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 and Section 02615 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

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
* 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. 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. Tightly connect pipe boot to piping with dual stainless steel straps.
- E. Grout lift holes from the outside using non-shrink grout.
- F. 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.

- G. 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.
- H. Install manhole to grade utilizing precast grade rings.

3.5 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.

3.6 SERVICE LINES

- A. Connect to main as indicated in Sections 02726 and 02729.
- 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.

3.7 CLEANOUTS

- A. Secure the Engineer's approval of locations for cleanouts in finished areas prior to installation.
- B. Set concrete collar around valve box at grade.

3.8 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.

3.9 Provide post video inspections complying with pertinent provisions of Section 02725 upon completion of service lateral by open cut or sewer main by open cut.

3.10 MEASUREMENT AND PAYMENT

- A. All work under this Section will be measured and paid for as specified hereinafter.
- B. Sewer pipe will be measured from center to center of manholes and depth of cut from invert to original ground at centerline. Payment will be made at the unit prices per linear foot as stated in the Bid Form, and shall include cost of excavation, pavement removal, bedding, backfilling, detection tape, dewatering, cleanup, testing, bypass pumping, traffic control, and pre and post televising, etc.
- C. Manholes will be measured from the lowest invert elevation to the top rim of the frame and paid for at the unit price each as stated in the Bid Form, which shall include all costs of excavation, bedding, dewatering, backfilling, materials, grade rings, stone base, standard frame and cover, bypass pumping, traffic control, testing, cleanup, trenching box and sheeting (if needed), etc.
- D. Service pipe and fittings will be measured along the horizontal distance from the centerline of main line to clean out and payment made at the unit price per linear foot as stated in the Bid Form. Payment will include all cost of excavation, backfill, pipe, fittings, bedding, clean-up, restoration, testing, pre and post televising, connection to existing system with full circle SS sleeve, traffic control, bypass pumping, etc. for a complete installation.
- F. Cleanouts - Payment will be made at the unit price stated for each in the Bid Form. Payment shall include cost of piping to the cleanout and plug, concrete collar, and reconnection to existing system with full circle SS sleeve.

END OF SECTION

SECTION 02751

TANK 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 05990 - Miscellaneous Metals.
 - 4. Section 09900 - Painting.
 - 5. Section 11296.1 - Valve, Altitude
 - 6. Section 13210 - Elevated Steel Tank

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 100% manufactured in the United States.
- C. Per SCDHEC Regulation 61-58.4.D(3), gaskets, O-rings, and other products used for joining pipes, setting meters or valves, or other appurtenances which will expose the material to the water shall comply with the requirements on R.61-58 (D) (1) and shall not be made of natural rubber or any other materials which will support microbiological growth.

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 specifications and other data needed to prove compliance with the specified requirements.
- C. Detailed piping layouts to include details and location of pipe supports.
- D. 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. If not shown on the drawings, piping 4" and larger shall be ductile iron pipe, including sanitary sewer lines, force mains and water lines unless otherwise indicated below:

Service	Size (Inches)	Buried (B) Exposed (E)	Pipe Material	Pipe Schedule	Lining	Gaskets
Drain Lines	4" & above		DIP			
Sump Pump Discharge			PVC	80		
Water Lines	4" & larger		DIP			

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 thickness class 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, minimum Class 52.
2. Clearly mark the class or nominal thickness, net weight without lining, and casting period on each length of pipe. Additionally, cast or stamp the manufacturer's mark, country where cast, year in which the pipe was produced, and the letters "DI" or "Ductile" on the pipe.
3. Buried Piping:
 - a. Provide depth of cover indicated on the drawings.
 - 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 Grade B, ASTM A307, hot dipped galvanized, standard carbon steel machine bolts, hex head.
4. 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 with country where cast stamped or cast into the flange.
 - 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.
5. Fittings:
 - a. Provide 250 psi rated ductile iron fittings or specials unless otherwise indicated, complying with ANSI/AWWA C110/A21.10 and in accordance with ANSI/AWWA C111/A21.11.
 - b. Clearly cast the manufacturer's mark, country where cast, year in which the fitting was produced, and the letters "DI" or "Ductile" on the fitting.
6. Restrained joint pipe and fittings:
 - a. Provide restrained joint pipe and fittings where indicated on the plans.
 - 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) TR-Flex by U.S. Pipe.
 - 4) Fast grip gasket by American Cast Iron Pipe Company.
 - 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.
 - 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.
7. Lining (All pipes and fittings):
 - a. Water and other services:
 - 1) Provide with standard thickness cement lining complying with ANSI/AWWA C104/A21.4 unless otherwise noted.

8. Coatings:
 - a. For buried service provide shop applied bituminous coating.
 - b. For exposed locations, provide prime coat per Section 09900.
- E. Plastic pipe and fittings (PVC):
1. Provide pipe with a minimum working pressure as indicated in the design pressures specified and the followings:
 2. Buried pipe:
 - a. Pipe 4" through 12": Comply with ANSI/AWWA C900.
 - b. Pipe 3" and smaller: Comply with ASTM D2241 for PVC 1120, SDR 21, with NSF approval marked at 18" intervals.
 - c. Joints:
 - 1) Provide integral bell or coupling type with elastomeric gaskets.
 - 2) Integral bells to comply with ASTM D2672.
 - 3) Couplings to comply with ANSI/AWWA C900.
 - 4) Gaskets to comply with ASTM F477.
 - 5) Lubricants shall be compatible with pipe and gasket materials, shall not support bacteria growth and shall not adversely affect potable quality of line contents.
 3. Exposed pipe:
 - a. Provide pipe complying with ASTM D1785 for PVC 1120, Schedule 80, dark gray color, unless otherwise indicated and NSF approved.
 - b. Provide solvent weld coupling joints.
 4. Fittings:
 - a. Buried pipe:
 - 1) 4" and larger: Provide ductile iron fittings as specified above.
 - 2) 3" and smaller: Provide PVC fittings, 160 psi at 73°F pressure rating, joint design to conform to pipe joints.
 - b. Exposed pipe:
 - 1) Use schedule 80 PVC fittings with solvent weld joints.
 - 2) Where threaded fittings are indicated, use Schedule 80 conforming to ASTM D2464.
 5. PVC Primer and Solvent Cement:
 - a. Primer:
 - 1) Provide NSF approved low VOC and CPVC primer that meets the requirements of ASTM F-656, SCAQMD Rule 1168/316A.
 - 2) Provide primer that is purple in color and has a specific gravity of 0.858 +/- 0.040.
 - 3) Provide primer with a max. VOC emissions of 550 G/L.
 - 4) Provide IPS Weld-On P-70 primer or equal.
 - b. Solvent Cement:
 - 1) Provide NSF approved CPVC chemical resistant solvent cement that meets the requirements of ASTM F-493 and SCAQMD Rule 1168/316A.
 - 2) Provide solvent cement that is specifically manufactured for chemical resistance to caustics, including hypochlorite solutions.
 - 3) Provide solvent cement that is gray in color and has a specific gravity of 0.982 +/- 0.040.
 - 4) Provide solvent cement with a max. VOC emissions of 490 G/L.
 - 5) Provide IPS Weld-On CPVC 724 chemical resistant solvent cement or equal.
 6. Restrained joint pipe and fittings:
 - a. Provide restrained joint pipe where indicated on the plans.
 - b. Provide restraint for all ductile iron fittings as specified above.
 - c. Provide restraint for C900 PVC by mechanical means separate from the mechanical joint gasket sealing gland.

- 1) Provide wide, supportive contact around full pipe circumference as follows:

<u>Size</u>	<u>Restraint Width</u>
4", 6"	1-1/2"
8", 10", 12"	1-3/4"

- 2) Provide means of restraint by machined serrations on inside surface of restraint device designed to provide circumferential loading over the entire restrainer.
 - a) Design to be such that restraint increases with increased in-line pressure.
 - b) Provide a minimum of 8 serrations per inch of restraint width.
- 3) Restraint device to be pressure rated at 350 psi, or equal to the pipe on which it is used and capable of withstanding test pressures of 2 times pressured rating.
- 4) Provide "MEGALUG" as manufactured by EBAA Iron Sales, Inc. of Eastland, Texas or approved equal.
- 5) Finish fusion applied epoxy coating per AWWA C-213.

F. Polyethylene encasement:

1. Provide polyethylene encasement of pipe and fittings where indicated on the plans.
2. Minimum nominal thickness of 8 mils. +/-10%.
3. Conform to AWWA C105.

G. 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.

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. Provide square two (2) piece escutcheon plate on exposed side(s) of sleeve(s).

1. Fabricate from .063" clear anodized aluminum sheet.
2. Mount with stainless steel sleeve and stainless steel stove bolts.

F. Acceptable manufacturer is Link Seal, Type S or equal.

2.4 PIPE WALL SLEEVES

- A. Provide ductile iron pipe sleeves at locations shown on the drawings.
- B. Provide pipe sleeves with flanged wall collars located at the center of the overall sleeve length.
- C. Pipe sleeves shall be statically cast with integral wall collars or fabricated from centrifugally cast ductile iron pipe with welded on collars.
- D. Pipe sleeve diameter shall be compatible with the carrier pipe diameter and the specified type of annular space sealing method.
- E. Provide square two (2) piece escutcheon plate on exposed side(s) of sleeve(s).
 1. Fabricate from .063" clear anodized aluminum sheet.
 2. Mount with stainless steel sleeve and stainless steel stove bolts.

2.5 WALL PIPES

- A. Provide ductile iron wall pipes at locations shown on the drawings.
- B. Provide wall pipes with flanged wall collars located at the center of the overall pipe length.
- C. Wall pipes shall be statically cast with integral wall collar or fabricated from centrifugally cast ductile iron pipe with welded on collars.
- D. All flanged ends and mechanical joint bell ends of wall pipes shall be tapped for studs.
- E. Studs for exposed wall piping to be Type 316 stainless steel.
- F. Studs for underground piping to be heavy duty, hot dipped galvanized.

2.6 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.

2.7 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.

2.8 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.

2.9 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".

2.10 COPPER TRACER WIRE

- A. Provide a continuous 12 gauge blue insulated copper tracer wire when PVC or polyethylene pipe is used.
- B. Approved for direct burial by the manufacturer.
- C. Locate tracer wire a minimum of 6" above top of water main.
- D. Terminate tracer wire at each valve and meter and make provisions to allow for connection of testing apparatus without interfering with the proper operation of valves and meters.
- E. Connect to the water line with duct tape at every bell connection or every 20' to ensure that the wire is directly over the top of the pipe.
- F. Place in the trench with all service lines.
- G. Splice at each service lateral and tee connection with an approved copper compression lug.
- H. Test all tracer wire for conductivity in accordance with Section 3.

2.11 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 250 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 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: Mechanical joint, restrained, non-rising stem with 2" metal operating nut with arrow indicating direction of opening.
- E. Exposed: Flanged with outside yolk and screw 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.
- H. Provide valve boxes and position indicators for all buried service valves and operators.
 - 1. Hermetically sealed for installation in a C.I. valve box.
 - 2. Show valve disc position, direction of rotation and number of turns from full open to full close.
 - 3. Shaft extension and pins to be stainless steel.
 - 4. Base plate and housing to be aluminum.
 - 5. Provide all bronze gearing.
 - 6. Provide 2" AWWA square nut.
 - 7. Locate top of indicator no more than 6" below grade.
 - 8. Approved manufacturer: Valcom or approved equal.

2.12 CHECK VALVES

- A. 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 18-8 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, 18-8 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. 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.
10. Valve shall be completely serviceable in the line, and all internal parts shall be removable through the top cover.
 11. The valve shall be Figure 250-D as manufactured by G.A. Industries, Inc. or Engineer approved equal.

B. Swing check valves, smaller than 3":

1. Valves smaller than 3" diameter shall be all brass.
2. End connections as required for the piping in which they are installed.
3. Valves shall have swing removable disc.
4. Valves shall be Class 250 working pressure type.
5. Valves to be manufactured in the United States.

2.13 STAINLESS STEEL BALL VALVES, 4" AND SMALLER

A. Provide the following for sizes under 3":

1. Full port Type 316 stainless steel ball valves where indicated on the plans or otherwise specified herein.
2. Lever handle operator. T-handle operator where space does not allow use of lever.
3. Three piece body that is in-line serviceable without removing the valve from the line.
4. Acceptable manufacturers:
 - a. Series "60" as manufactured by Whitey.
 - b. Apollo Series 86A as manufactured by Conbraco.
 - c. V3P-1000 as manufactured by Velan.

B. Provide the following for sizes 3" - 4":

1. Regular port stainless steel ball valves where indicated on the plans or otherwise specified herein.
2. Oval handle operator.
3. Top entry design, fully serviceable without removing the valve body from the line.
4. Seal body cover to body section with fully enclosed spiral wound graphite gasket.
5. Adjustable two-piece packing gland and pre-compressed solid packing rings.
6. Acceptable Manufacturers: Series "TE-150/300/600" as manufactured by Velan or approved equal.

C. Provide quarter turn valves.

D. Provide with standard locking devices.

E. Provide with pre-tapped actuator mounting holes.

F. Provide blowout-proof stem.

G. Provide stem with RPTFE live load thrust washer.

H. Support valve seats by a small stainless steel coned disc spring which provides a positive sealing force at high and low pressures.

1. Seats are to automatically compensate for wear and thermal expansion.

I. Materials of construction:

Body and body cover	316 SS (CF8M)
Ball	316 SS
Stem	316 SS
Seats	PTFE
Stem packing	PTFE
Stem thrust washer and bushing	RPTFE
Body seal	316 SS Graphite
Gland follower	304 SS
Grounding spring	302 SS
Packing Flange	316 SS (CF8M)
All bolts and nuts	B8M Cl.2, 8M, or 304 SS
Handle	304 SS
Handle grip	Vinyl

2.14 HYDRANTS

- A. Fire hydrants shall conform to ANSI/AWWA C502 and the following:
1. Waterway valve opening, 5-1/4".
 2. Six (6) inch bell connection, two 2-1/2" hose connections, one 4-1/2" steamer connection with cap chain on all connections.
 3. Provide two (2) bronze mounted hose gate valves.
 4. National Standard screw threads on outlet nozzles.
 5. Open by turning counter-clockwise with arrow cast in top indicating direction of opening.
 6. Two part breakable safety flange shall be an integral part of barrel casting.
 7. Depth of bury, 3'6".
 8. Finish coat with industrial enamel. Color to be red.
 9. Provide Mueller Company Super Centurion A-423 (5-1/4").
 10. Provide industry standard blue hydrant reflector for paved roadway.
- B. Provide one (1) hydrant wrench for each five (5) hydrants.
- C. Offset fitting:
1. Provide an offset fitting between the shut-off valve and each hydrant with a 12" offset where required to install the hydrant to the proper elevation.
 2. Ductile iron per AWWA C153, compact design, coated per AWWA C104.
 3. Provide split gland mechanical restrained joint on each end.
 4. Provide Grade Lok as manufactured by Assured Flow Sales, Inc., or approved equal.

2.15 TAPPING SLEEVE AND VALVE

- A. Tapping sleeve:
1. Provide Type 304L stainless steel per ASTM A240.
 2. Provide rolled thread stainless steel bolts per ASTM A153, Type 304.
 3. Provide Type 304 stainless steel hex head nuts, coated to prevent galling.
 4. Virgin SBR gaskets, compounded for water and wastewater service.
 5. Provide 3/4" NPT stainless steel test plug.
 6. Maximum working pressure of 200 psi.
 7. Provide ROMAC Industries Model SST or approved equal.
- B. Tapping valve:
1. Construct of material compatible with tapping sleeve.

2. Provide gate valve as specified.
 3. Joints - Flange to tapping sleeve, mechanical joint for pipe end.
- C. Tie rods:
1. Provide steel rods complying with ASTM Designation A242, galvanized in accordance with ASTM Designation A123.
 2. Acceptable products: Super Star Tierod Figure No. SS12 and Tiebolt Figure No. SST7 as manufactured by Star National or approved equal.

2.16 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 riser wall thickness 1/4" and thickness at the top of 11/16".
- D. Have the word "WATER" 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.

2.17 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.

2.18 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.

2.19 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. Comply with requirements of local codes.
 - 3. Excavation and backfilling to comply with pertinent provisions of Section 02221.
 - 4. Lower pipe and accessories into trench by means of derrick, ropes, belt slings, or other equipment approved by the Engineer.
 - 5. Do not dump or drop any of the materials of this Section into the trench.
 - 6. Except where necessary in making connections to other lines, lay pipe with the bells facing in the direction of laying.
 - 7. Rest the full length of each section of pipe solidly on the pipe bed, with recesses excavated to accommodate bells, couplings, and joints.
 - 8. Take up and relay pipe that has the grade or joint disturbed after laying.
 - 9. 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.
 - 10. Securely close open ends of pipe, fittings, and valves when work is not in progress.
 - 11. 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. Plastic pipe, gasketed joints:
1. Clean gasket, bell or coupling interior, especially groove area.
 2. Lubricate and insert gasket as recommended by manufacturer.
 3. Align spigot to bell, insert spigot into bell until it contacts gasket uniformly.
 4. Push pipe "home" until reference mark is at proper location.
- D. 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.
- 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.
- G. Wall pipe:
1. Coat threaded ends of studs with graphite prior to installation.
- H. 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 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.

3.7 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.

3.8 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.

3.9 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.

3.10 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 HYDRANTS

- A. Inspect carefully, insuring that all foreign material is removed from the barrel.
- B. Set plumb and at such elevation that connecting pipe and distribution main have same depth of cover.
- C. Install washed stone drainage bed and thrust blocking as indicated.
- D. Install blue hydrant reflector on centerline of paved roadway marking the perpendicular location of fire hydrant with reference to the road centerline.
- E. Fully open and close each hydrant to assure that all parts are in working condition.

3.12 TRACER WIRE TESTING

A. General:

1. Utilize an approved magnetic locating device, M Scope or Equal.
2. Connect a cable conductively from the transmitter to a metal ground rod and to the tracer wire.
3. Locate the line following the instructions of the magnetic locating device.
4. If interference is encountered from adjacent utilities or if the depth of bury or line length interferes with the signal, install a dummy valve box with access to the tracer wire at no additional cost to the owner.
5. Where there is a break in the tracer wire, repair with 3M DBY or ILSCO #IK-8 repair kit and wrap with poly wrap for cathodic protection.

B. Creek crossing and wetland areas:

1. Send a prescribed frequency with a shore line base signal ejector between 25 and 1024 HZ down a metal medium and read by a receiver.
2. Select a frequency based on the depth and the amount of linear feet of the line.
3. If the tracer wire has a break, reinstall the cable and repeat the conductivity test at no additional cost to the owner.

C. Notify in advance and conduct all testing in the presence of the Engineer.

3.13 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):

$$L = S \times D \times \sqrt{P} / 148,000; \text{ where}$$

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.
 - 2) Repair all visible leaks regardless of test results.

3.14 STERILIZATION

A. General:

1. Upon completion of testing, sterilize all water lines to meet requirements of the South Carolina Department of Health and Environmental Control (SCDHEC).
2. Newly laid valves or other appurtenances shall be operated several times while line is filled with chlorinating agent.
3. Should initial treatment fail to meet results specified, repeat procedures until satisfactory results are obtained, at no additional cost to the Owner.
4. All pipe taps, feeders, chemicals, etc. for sterilization shall be provided by the Contractor.

B. Procedure:

1. Flush line to extent possible with available pressure and outlets, prior to installation.
 - a. Hydrant openings required to produce proper flushing velocity at 40 psi are:

Pipe Size (Inches)	Hydrant Openings
4 through 12	1 - 2-1/2"
14 through 18	2 - 2-1/2"
20	1 - 4-1/2"

2. Apply chlorine as liquid chlorine or chlorine compound such as calcium hypochlorite with known chlorine content.
3. Apply through corporation cock in top of main, at beginning of section being sterilized.
4. Use proper feeder and flow regulator to introduce chlorinating agent.
5. Application rate shall be not less than 50 ppm.
6. Retain chlorinated water in main not less than 24 hours.
7. At end of retention period, at least 10 ppm of chlorine shall remain in the water at the extreme end of section.
8. Flush line thoroughly.

C. Acceptance:

1. Provide two separate samples for each sample location, taken at 24-hour intervals, free of coliform bacteria.
 - a. Contractor to take 1st and 2nd samples, deliver to South Carolina Department of Health and Environmental Control (SCDHEC) approved laboratory for testing.
 - b. The 1st and 2nd sample results shall include the free chlorine residual at the time the samples were collected.
 - c. Notify SCDHEC to take a 3rd sample.
2. At a minimum, sample locations shall be as required by SCDHEC and the following:
 - a. The tie-in location of new and existing water lines.
 - b. The end of all dead end lines.
 - c. At intervals of no more than 3,000' for all new lines longer than 3,000' in length.
3. All sample locations are to be given an identifying label and a corresponding identification label is to be included on the record drawings indicating each sample location.

3.15 DECHLORINATION OF CHLORINATED STERILIZATION WATER

- A. Dechlorinate the chlorinated water used for sterilizing water lines.
- B. Apply dechlorinating agent as liquid sulfur dioxide or sulfite solution.
- C. Prepare a mixing chamber using a 55-gallon tank. Feed the discharge and dechlorinating agent at the bottom of the tank with overflow at the top.
- D. Discharge total chlorine residual to be less than 0.5 milligrams per liter.

3.16 PAINTING

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

3.17 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 03300
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide cast-in-place concrete, including formwork and reinforcement, 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 (ACI) Publications:
 - ACI 301 Specification for Structural Concrete for Buildings
 - ACI 305 Recommended Practice for Hot Weather Concreting
 - ACI 306 Recommended Practice for Cold Weather Concreting
 - ACI 315 Manual of Standard Practice for Detailing Reinforced Concrete Structures
 - ACI 318 Building Code Requirements for Reinforced Concrete
 - ACI 347 Recommended Practice for Concrete Framework
 - 2. American Society for Testing and Materials (ASTM) Publications:
 - A185 Welded Steel Wire Fabric for Concrete Reinforcement
 - A615 Deformed and Plain Billet Steel Bars for Concrete Reinforcement
 - C31 Making and Curing Concrete Test Specimens in the Field
 - C33 Concrete Aggregates
 - C39-72 Compressive Strength of Cylindrical Concrete Specimens
 - C94 Ready-Mixed Concrete
 - C150 Portland Cement
 - C260 Air-Entraining Admixtures for Concrete
 - 3. Concrete Reinforcing Steel Institute (CRSI):
 - "Manual of Standard Practice"
 - 4. American Welding Society (AWS) Publication:
 - D12.1-61 Welding Reinforcement Steel, Metal Inserts and Connections in Reinforced Concrete
- C. Testing agency: A testing laboratory will be retained by the Owner to perform material evaluation tests required by these specifications.
- D. Qualifications of contractors performing concrete work: Minimum of two (2) years experience on comparable concrete projects.

- E. 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.
 - 3. Required average strength above specified strength:
 - a. Determinations of required average strength above specified strength ($f'c$) shall be in accordance with ACI 318 and ACI 301.
 - b. Establish the required average strength of the design mix using the materials proposed to be employed. Standard deviations shall be determined by thirty tests. Average strength used for selecting proportions shall exceed specified strength ($f'c$) by at least:

400 psi	Standard deviation is less than 300
550 psi	Standard deviation is 300 to 400
700 psi	Standard deviation is 400 to 500
900 psi	Standard deviation is 500 to 600
1200 psi	Standard deviation is above 600 or unknown
 - c. When the ready-mix producer does not have a record of past performance, the combination of materials and the proportions selected shall be selected from trial mixes having proportions and consistencies suitable for the work using at least three (3) different water/cement ratios which will produce a range of strengths encompassing those required. Average strength required shall be 1200 psi above specified strength.
 - 4. Cost of this work shall be borne by the Contractor.
- C. Manufacturer's data: Submit manufacturer's specification with application instructions for proprietary materials and items, including curing compound, form release agents, admixtures, patching compounds, and others as required by the Engineer.
- D. 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.
 - 2. Cementitious coating.

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 ensure 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.
 - 1. Use ties with cones that allow a 1" break back and facilitate patching.
 - 2. On structures containing water or other liquid or below grade structures, use embedded rod ties with integral waterstops in addition to cones.
 - 3. Through-bolts that utilize a removable tapered sleeve in water containing and below grade applications: Use mechanical EPDM rubber plugs to seal holes made after removal of taper ties. Acceptable product is X-Plug by the Greenstreak Group, Inc. 800-325-9504. Follow manufacturers' instructions for installation. Friction fit plugs are not allowed.
 - 4. Wire ties and wood spreaders will not be permitted.
- 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.
 - 1. On surfaces to receive an applied coating, use a residual free chemical form release agent which is compatible with the applied coating and will not prevent the applied finish from satisfactorily bonding to the concrete.
- E. Chamfer strips: Chamfer strips shall be wood or polyvinyl strips or approved equal, designed to be nailed in the forms to provide a 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. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are hot-dip galvanized, plastic protected or stainless steel.
 3. 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. Welding electrodes: AWS A5.1, low hydrogen, E70 series.
- G. 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. Superplasticizers: Conform to ASTM C494, Types F and G.
 - a. Use superplasticizers in thin section placements and in areas of congested reinforcing and/or embedded items, or where otherwise approved by the Engineer.
 - b. Use where conventional consolidation techniques are impractical.
 4. Do not use admixtures containing calcium chloride.

- E. Fiber reinforcing:
1. Use fiber reinforcing where indicated on the drawings.
 2. Provide polypropylene or co-polymer fibers as manufactured by High Tech Fibers, Inc., Fibermesh Company or an approved equal.
 3. Where required, use fiber reinforcing at a rate of 2.0 lbs. per cubic yard unless another rate is indicated on the drawings.
- F. 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. On building floor slabs not otherwise receiving an applied coating or finish and on other flatwork as indicated on the Drawings, provide an acrylic copolymer curing and sealing compound conforming to ASTM C309 Type 1 and the following:
 - a. Non-yellowing.
 - b. Minimum 20% solids.
 - c. Maximum unit moisture loss in accordance with ASTM C156 - 0.40 kg./sq.m at 72 hours.
 - d. Acceptable products are Dress & Seal by L&M Construction Chemicals, Inc., Clear Seal Standard by A. C. Horn Company, Kure-N-Seal 0800 by Sonneborn, Inc., or 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:
- | | |
|---|----------|
| 1. All structural concrete except as indicated in Nos. 2 and 3 below or as noted otherwise on the plans | 4000 psi |
| 2. All sidewalks, curbs and gutters, and unreinforced foundations | 4000 psi |
| 3. Thrust blocking, backfill or encasement for piping, and concrete fill | 2500 psi |
| 4. Prestressed or precast concrete: | 5000 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 observed 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. Form construction and erection:

1. Construct forms in conformance with ACI 347.
2. Provide for openings, offsets, keyways, recesses, moldings, reglets, chamfers, blocking, screeds, bulkheads, anchorages, inserts and other embedded items as required.
3. Hold inner and outer forms for vertical concrete together with combination steel ties and spreaders approved by the Engineer.
4. Unless specifically stated otherwise, provide 3/4" chamfer at all exposed edges of concrete.

5. Provide temporary openings in the formwork where necessary to facilitate cleaning and inspection of the formwork.
 6. Coat form contact surfaces with approved form coating compound prior to placing reinforcing steel.
 7. Do not allow excess form coating material to accumulate in the forms or to come in contact with reinforcing surfaces which will bond to fresh concrete.
 8. Side forms for footings may be omitted, and concrete may be placed directly against excavation only when requested by the Contractor and approved by the Engineer.
 9. Provide a positive means of adjustment of shores and struts and ensure that all settlement is taken up during concrete placing.
 10. Construct blockouts and formed openings of sufficient size and proper location to permit final alignment of items within it or passing through it.
 - a. Allow sufficient space for grouting, packing or sealing around any items penetrating the opening as may be required to ensure watertightness.
 - b. Provide openings with continuous keyways with waterstops where required, and provide a slight flare to facilitate grouting and the escape of entrapped air during grouting.
 - c. Provide only blockouts or openings that are shown on the drawings or otherwise approved by the Engineer.
- C. Formwork reuse: Reuse only forms that are in good condition and which maintain a uniform surface texture on expose concrete surfaces.
1. Apply a light sanding as necessary to obtain a uniform texture.
 2. Plug unused tie holes and penetrations flush with the form surface.
- D. 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. Do not remove forms before the following minimum times without prior approval from the Engineer:

a.	Sides of footings or slabs on grade	24 hrs
b.	Walls not supporting load	48 hrs
c.	Vertical sides of beams	48 hrs
d.	Columns not supporting load	48 hrs
e.	Suspended slabs or beam bottoms (forms only)	10 days
 3. In determining the minimum stripping times, consider only the cumulative time during which the ambient temperature of the air surrounding the concrete is above 50°.
 4. Do not remove shoring for suspended slabs or beams until the concrete has reached 75% of the specified 28 day strength.
 5. 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.
 6. 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.
 7. Do not permit steel spreaders, form ties, or other metal to project from or be visible on any concrete surface except where so shown on the drawings.
 8. Whenever the formwork is removed during the curing period, continue to cure the exposed concrete by one of the methods specified herein.

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.
 - 1. Use templates where practical for all anchor bolts.
 - 2. Check locations of all anchor bolt and special castings prior to placing concrete and verify locations after concreting.
- 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.
 - 1. Do not use conduits running within (not passing through) a slab, wall or beam that are larger in outside diameter than 1/3 overall concrete thickness unless otherwise approved by the Engineer.
 - 2. Do not space conduits closer than three conduit diameters apart unless otherwise approved by the Engineer.

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 or 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.
1. All splices at wall corners or intersections and at wall and foundation intersections shall be Class B tension splices per ACI 3-18, Sections 12.2.2 and 12.15.
 2. All other splices of vertical or horizontal steel in walls shall be Class B tension splices as per ACI 318 per ACI 318, Sections 12.2.2 and 12.15.
 3. Horizontal ring steel in circular, non-prestressed concrete tanks shall be Class B tension splices and the splices shall be staggered so that no more than 50% of the bars are spliced at any one location.
 4. All welded or mechanical splicing devices shall develop 125% of the yield strength of the bar.
 5. Column vertical bars shall lap 30 bar diameters with dowels at the base of the column unless otherwise noted. Dowels shall be the same size and quantity as column vertical bars unless otherwise noted.
 6. All splices not otherwise shown or specified shall be Class B tension lap splices per ACI 318, Sections 12.2.2 and 12.15.
- E. Tolerances: Place bars in the locations indicated within the tolerances conforming to the CRSI "Manual of Standard Practice".
- F. Welded wire mesh: Install welded wire fabric in as long of a length as practicable and lay flat before placing concrete.
1. Use only mat welded wire fabric. Do not use welded wire fabric from rolls.
 2. Support and tie mesh to prevent movement during concrete placement.
 3. Lap adjoining pieces at least one full mesh and lace splices with wire.
 4. Provide, at a minimum, supports for welded wire fabric according to the Table in Section 2.2.D.3. Confirm the adequacy of the support spacings listed therein for the anticipated construction loads. Increase the number of supports, if necessary, to assure that the final position of the welded wire fabric will conform to that shown on the drawings.
 5. Do not place welded wire fabric on the subbase surface and then hook or "pull up" the reinforcement during concrete placement.
 6. Do not lay welded wire fabric on top of the freshly placed concrete and then "walk it" into place.

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. Provide equipment for lifting, dumping, chuting, pumping or conveying the concrete, of such size and design as to ensure a practically continuous flow of concrete at the delivery and without separation of materials.
 3. Use hoppers and elephant trunks where necessary to prevent the free fall of concrete for more than 4'.
 4. Do not use concrete that is not placed within 1-1/2 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.
 4. Bring slab surfaces to the correct level with screeds set to the proper elevation.
- D. Hot weather placement: Place concrete in hot weather in accordance with ACI 305 "Hot Weather Concreting" and as specified herein.
1. Do not place concrete whose temperature exceeds 100°F.
 2. Thoroughly wet forms and reinforcing prior to placement of concrete.
 3. Use additional set retarder as necessary to increase set time.
 4. Limit the size of the pour where it may reduce the likelihood of cold joints due to reduced set time.
 5. Shade the fresh concrete as soon as possible after placing.
 6. Start curing as soon as the concrete is sufficiently hard to permit without damage.
- E. Cold weather placement: Place concrete in cold weather in accordance with ACI 306 and as specified herein.
1. Except when authorized specifically by the Engineer, do not place concrete when the atmospheric temperature is below 40°F.
 2. When cold weather placement is approved by the Engineer, heat either the mixing water or aggregate or both so that the concrete temperature is between 65°F and 85°F.
 3. Protect the freshly placed concrete by adequate housing or covering and provide heat to maintain a temperature of not less than 50°F for not less than four days.
 4. Do not add salts, chemicals, or other materials to the concrete mix to lower the freezing point of the concrete.
- F. Consolidation:
1. Consolidate each layer of concrete immediately after placing, by use of internal concrete vibrators supplemented by hand spading, rodding, or tamping.
 - a. Use vibrators having a 2" head diameter and a minimum frequency of 8000 vibrations per second.
 - b. Provide sufficient number of vibrators to properly consolidate the concrete, keeping up with placement operations.
 - c. Provide at least one spare vibrator on site.
 2. Insert and withdraw vibrators at points approximately 18" apart.
 3. Do not vibrate forms or reinforcement.
 4. 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.
 - 1. When seven-day cylinder breaks indicate, in the opinion of the Engineer, the possibility of low strength concrete, provide additional curing as per the request of the Engineer.
 - 2. When temperatures during the curing period fall below 40°F, provide additional curing time as directed by the Engineer.
- 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.
 - 5. Curing compound: Apply curing compound immediately after completion of the finish on uniformed surfaces and within two hours after removal of forms on formed surfaces.
 - a. Spray the entire surface with two coats of liquid curing compound, applying the second coat in the direction of 90° to the first coat.
 - b. Apply compound in accordance with the manufacturer's instructions to cover the surface with a uniform film which will seal thoroughly.
- D. Hot weather: When necessary, provide wind breaks, shading, fog spraying, sprinkling, ponding or wet covering with a light colored material applying as quickly as concrete hardening and finishing operations will allow.

3.8 CONCRETE FINISHING

A. Finish schedule: Unless otherwise indicated on the drawings, finish all concrete surfaces in accordance with the following schedule:

1. Form finish: Formed surfaces not ordinarily exposed to view, including:
 - a. Interior walls of open tanks below a line one foot lower than the lowest normal water level.
 - b. The underside of slabs not exposed to view.
 - c. Walls below grade.
2. Cementitious coating: All formed surfaces exposed to view including:
 - a. Interior walls of tanks above a line one foot lower than the lowest normal water level.
 - b. The underside of slabs, soffits, etc. exposed to view.
3. Float finish: Slab surfaces not exposed to view or not receiving an applied thin finish, including:
 - a. Bottom slabs of tanks or structures containing water sewage or other liquid.
 - b. Foundations not exposed to view.
 - c. Roof slabs to be covered with insulation and/or built-up roofing.
4. Trowel finish: Interior slab surfaces exposed to view or to receive an applied thin film coating or floor finish, including:
 - a. Interior, indoor slabs and floors of buildings.
 - b. Surfaces on which mechanical equipment moves.
 - c. Floors receiving vinyl tile, resilient flooring, carpet, paint, etc.
5. Broom finish: Exterior, outdoor slabs exposed to view including:
 - a. Outdoor floor slabs and walkways.
 - b. Other floors which may become wet or otherwise require a non-skid surface.
 - c. Sidewalks and concrete pavements.
6. Scratch finish: Surfaces which are to receive a thick topping or additional concrete cast against them including:
 - a. Surfaces receiving concrete equipment pads.
 - b. Floors receiving concrete topping.
 - c. Construction joints not otherwise keyed.
7. Edge finish: Exposed edges of slabs not receiving chamfer including:
 - a. Sidewalk edges and joints.
 - b. Pavement edges and joints.
 - c. Other slab edges not chamfered.

B. Finishing procedures:

1. Form finish:
 - a. Repair defective concrete.
 - b. Fill depressions deeper than 1/4".
 - c. Fill tie holes.
 - d. Remove fins exceeding 1/8" in height.
2. Cementitious finish:
 - a. Patch all tie holes and defects and remove all fins.
 - b. Within one day of form removal, fill all bug holes, wet the surfaces and rub with carborundum brick until a uniform color and texture are produced; or
 - c. Dampen surfaces, brush apply a grout slurry consisting of 1 part portland cement to 1-1/2 parts sand, and rub the surface vigorously with a stone. Remove all excess grout.
 - d. Provide a two coat cement base waterproofing, sealing finish of Thoroseal and Thoroseal Plaster Mix as manufactured by Standard Dry Wall Products, Inc. or an approved equal.

- 1) Patch all tie holes and defects and removal all fins, and clean surface of all dirt, laitance, grease, form treatments, curing compounds, etc.
 - 2) Key coat: Apply key coat of Thoroseal at a rate of two (2) lbs. per sq. yd. by fiber brush. Mix material using one part of Acryl 60 to three parts clean water. Should material start to drag during application, dampen surface with water. During hot weather periods, dampen surfaces with water prior to application of key coat material. Key coat shall be allowed to cure for five (5) days before applying finish coat.
 - 3) Apply a finish coat consisting of a four (4) to six (6) lbs. per sq. yd. application of Thoroseal Plaster Mix using steel trowel or spray gun. Color to be selected by the Owner. Mix dry material using one (1) part Acryl 60 to three (3) parts clean water. Firmly press the mix into all voids and level with a steel trowel. When surface is set so that it will not roll or lift, float it uniformly using a sponge float.
3. Float finish:
 - a. Begin floating when the water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation.
 - b. Cut down all high spots and fill all low spots and float the slab to a uniform sandy texture.
 4. Trowel finish:
 - a. Float finish as specified herein.
 - b. Power trowel to a smooth surface free of defects.
 - c. After the surface has hardened sufficiently, hand trowel until a ringing sound is produced as the trowel is moved over the concrete surface.
 5. Broom finish:
 - a. Float finish as specified herein.
 - b. Provide a scored texture by drawing a broom across the surface.
 6. Scratch surface:
 - a. Screed the surface to the proper elevations.
 - b. Roughen with rakes or stiff brushes.
 7. Edge finish: Tool slab edges and joints with a 1/4" radius edging tool.

3.9 SURFACE REPAIR

- A. Patching mortar:
 1. Make a patching mortar consisting of 1 part portland cement to 2-1/2 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 feather edges.
 3. Dampen surfaces to be patched.
 4. Patch defects by filling solidly with repair mortar.
- D. Allow the Engineer to observe the work before placing the patching mortar.
- E. Repair defective areas greater than 1 sq. ft. or deeper than 1-1/2" as directed by the Engineer using materials approved by the Engineer at no additional expense to the Owner.

3.10 JOINTS

A. Construction joints:

1. Unless otherwise approved by the Engineer, provide construction joints as shown on the drawings.
2. If additional construction joints are found to be required, secure the Engineer's approval of joint design and location prior to start of concrete placement.
3. Continue all reinforcing across construction joints and provide 1-1/2" deep keyways unless indicated otherwise on the drawings.
 - a. Form keyways in place.
4. Provide waterstops in all construction joints of liquid containing structures, structures below grade or other structures as shown on the drawings.

B. Expansion joints:

1. Provide expansion joints of size, type and locations as shown on the drawings.
2. Do not permit reinforcement or other embedded metal items that are being bonded with concrete (except smooth dowels bonded on only one side of the joints, where indicated on the drawings) to extend continuously through any expansion joint.
3. Provide waterstops where required.

C. Control or contraction joints:

1. Locate and construct control and contraction joints in accordance with the Drawings.
2. Where no specific joint pattern is indicated in slabs on grade or concrete pavements, submit a proposed joint layout to the Engineer for approval.
3. Where no specific joint details are shown on the drawings, joints may be tooled, preformed or saw-cut.
4. Saw-cut joints as soon as the concrete has hardened sufficiently to prevent aggregates from being dislodged by the saw.

3.11 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 selected 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 Owner.
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. Dimensional tolerances:
1. Dimensional tolerances for allowable variations from dimensions or locations of concrete work, including the locations of embedded items shall be as given in ACI 301.
 2. Where anchor bolts or other embedded items are required for equipment installation, comply with the manufacturer's tolerances if more stringent than those stated in ACI 301.
- F. Watertight concrete:
1. All liquid containing structures, basements or pits below grade shall be watertight.
 2. Any visible leakage or seepage shall be repaired as instructed by the Engineer at no expense to the Owner.
 3. Where physical evidence of honeycombing, cold joints or other deficiencies which may impair the watertightness of a structure exists, the Engineer may at his discretion call for leak testing of the structure.
 - a. Fill the structure with water and allow to stand for not less than 48 hours.
 - b. Make repairs on the structure until all visible leaks are sealed and the leakage rate of the water in the structure is less than 0.1% of the volume held in the structure per day.

- c. The cost of testing and repairs shall be performed at no expense to the Owner.
- G. 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.

3.12 MEASUREMENT AND PAYMENT

- A. No 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 in which the concrete work is an integral part.

END OF SECTION

SECTION 03600
NON-SHRINK GROUT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Provide non-shrink grout for structural grouting, equipment bases, etc. as indicated 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. Other provisions concerning non-shrink grout may also be stated in other Sections 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.
- B. Product data: Within 90 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. Prevent damage to or contamination of non-shrinking grouting materials during delivery, handling and storage.
- C. Deliver grout to site in polyethylene lined paper bags, not larger than one cubic foot in capacity.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Non-shrink grout:
 - 1. Provide non-metallic, non-shrink grout.
 - 2. Grout shall evidence no shrinkage when tested in the plastic state, in accordance with ASTM C 827, or in the hardened state, in accordance with ASTM C RD588.

3. Initial setting shall not occur in less than 60 minutes.
4. Compressive strength in 24 hours shall not be less than 3000 psi, when tested in accordance with ASTM C 109.
5. Acceptable products: U.S. Grout Corporation's Five Star Grout; Sonneborn's SonogROUT; W.R. Bonsal Company's Type A Construction Grout; or equal.

B. Water: Potable grade.

C. Gravel: Comply with ASTM C 33 for coarse aggregate graded so that 90% passes 3/8" sieve and 90% is retained by No. 4 sieve.

2.2 MIXES

A. Less than 2" clearance or for difficult grouting locations mix shall consist of grout material and water.

B. Greater than 2" clearance where coarse aggregate will not obstruct free passage, extend grout by adding 1/2 pound of gravel to one pound grout material, except where prohibited by manufacturer's recommendations.

C. Use the minimum amount of water necessary to produce a flowable grout without causing segregation or bleeding.

2.3 MIXING

A. Mix non-shrink grouting material and water in a mechanical mixing for no less than 3 minutes, unless otherwise approved by the Engineer.

B. Mix as close to work area as possible and transport the mixture quickly and in a manner that does not permit segregation of materials.

C. Retempering of grout will not be permitted.

PART 3 - EXECUTION

3.1 FORMWORK

A. Build leak proof forms that are strong and securely anchored and shored to withstand grout pressures.

B. Provide ample clearance between formwork and the area to be grouted to permit proper placement of grout.

3.2 SURFACE PREPARATION

A. Remove all defective concrete, laitance, dirt, oil, grease and other foreign material from concrete surfaces by bush-hammering, chipping, or other similar means, until a sound, clean concrete surface is achieved.

B. Lightly roughen the concrete, but not enough to interfere with the proper placement of grout.

C. Remove foreign materials from all steel surfaces in contact with grout.

D. Align, level and maintain final positioning of all components to be grouted.

E. Take special precautions during extreme weather conditions according to the manufacturer's written instructions.

- F. Saturate all concrete surfaces with clean water; remove excess water and leave none standing.

3.3 PLACING

- A. Place non-shrink material quickly and continuously by the most practical means permissible: pouring, pumping or under gravity pressure.
- B. Apply grout from one side only to avoid entrapping air.
- C. Final installation shall be thoroughly compacted and free from air pockets.
- D. Do not vibrate the placed grout mixture, or allow it to be placed if the area is being vibrated by nearby equipment.
- E. Do not remove leveling shims for at least 48 hours after grout has been placed.
- F. After shims have been removed, fill voids with plain cement-sand grout.

3.4 CURING

- A. Cure grout for 3 days after placing by keeping wet and covering with curing paper or by another approved method.

3.5 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 11307
TEMPORARY BYPASS PUMPING SYSTEM

PART 1 - GENERAL

1.1 SCOPE

- A. Work included: Provide all materials, labor, equipment, power, maintenance, etc. to implement a temporary pumping system for the purpose of diverting the existing flow around work areas for the duration of the interruption to normal operation of the facilities.
- B. Provide complete design, installation and operation of the temporary pumping system.
- C. Provide a complete and operable system, fully self-sufficient, requiring no external power.
- 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 02722 - Sewers, Sanitary Gravity.
 - 3. Section 02726 - Rehabilitation of Existing Sewers Utilizing Pipe Bursting.
 - 4. Section 02729 - Rehabilitation of Existing Sewers Utilizing Cured-in-Place Pipe.
 - 5. Section 02730 - Rehabilitation of Existing Manholes.

1.2 QUALITY ASSURANCE

- A. Referenced provider of temporary bypass pumping system is Godwin Pumps of America, and is named to establish standards of quality. Products by other suppliers conforming to this specification and conforming to the Bid Form 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.
- C. Provide a minimum of five (5) references of projects similar in size, complexity and nature performed by the system supplier within the past three years and where reliable 24 hour service can be demonstrated.
- D. Comply with the requirements of all codes and regulatory agencies having jurisdiction.
- E. The bypass system is an integrated system and to be furnished by a single manufacturer or system supplier who shall provide all the equipment and appurtenances necessary to achieve a fully integrated and operational system and be responsible to the Contractor for operation of the entire system.
 - 1. System supplier to be certified by the pump manufacturer to install and service the equipment.
- F. Maintain water flow around the work area in a manner that will not cause

surcharging of gravity systems or damage to facilities, and that will protect public and private property from damage.

- G. Protect water resources, wetlands, and other natural resources.
- H. If required, obtain approval from the South Carolina Department of Health and Environmental Control.

1.3 SUBMITTALS

- A. Submit bypass pumping and/or diversion plans for review at least 30 working days prior to the work.
- B. Submit plans and descriptions outlining all provisions and precautions to be taken regarding the handling of existing flows. The plan to include but not be limited to details of the following:
 - 1. Staging areas for pumps.
 - 2. Pipe plugging method and types of plugs.
 - 3. Number, size, material, location and method of installation of suction piping.
 - 4. Number, size, material, method of installation and location of installation of discharge piping.
 - 5. Bypass pump sizes, capacity, number of each size to be on site and power requirements.
 - 6. Calculations of static lift, friction losses, and flow velocity (pump curves showing pump operating range shall be submitted).
 - 7. Method of protecting discharge structures from erosion and damage.
 - 8. Restraint system for all piping.
 - 9. Sections showing suction and discharge pipe depth, embedment, select fill and special backfill.
 - 10. Method of noise control for each pump and/or generator to ensure all local noise ordinances are met. Provide enclosure where specified or required by local regulations or ordinances.
 - 11. Any temporary pipe supports and anchoring required.
 - 12. Design plans and computation for access to bypass pumping locations indicated on the drawings.
 - 13. Calculations for selection of bypass pumping pipe size.
 - 14. Schedule for installation of and maintenance of bypass pumping lines.
 - 15. Plan indicating selection location of bypass pumping line locations.
 - 16. Plan must include proper protection of the bypassing facilities.
 - 17. Bypass pumping plan must include an emergency response plan to be followed in the event of a failure of the bypass pumping system.
 - 18. Emergency contact number, providing 1 hour response time, 24 hours a day, 7 days a week.
 - 19. For potable water bypassing, a disinfection plan, including feed points and sample locations for bacteriological sampling of system prior to and during operation.
 - 20. Safety and security plan to protect and minimize risk to public and to prevent vandalism.
- C. Notify Engineer 48 hours prior to commencing with the bypass pumping operation.

1.4 JOB CONDITIONS

- A. Provide safety equipment as specified in Section 01500.

- B. Access to some parts of the project is challenging. The contractor is to visit the site and consider all issues and include cost of access and working in the existing conditions into the price bid for the work to be performed.
- C. Provide 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, MSHA/NIOSH approved type.
 5. Safety harness and life lines.
 6. This equipment to be available for use by the Contractor, Engineer and Owner for the duration of the project.
 7. 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. Provide only reliable, clean equipment and materials in accordance with these specification and applicable regulatory requirements.
- B. Provide fully automatic units.
- C. Provide one of the following:
 1. Self-priming pump units that do not require the use of foot-valves or vacuum pumps in the priming system and are constructed to allow dry running for long periods of time to accommodate the cyclical nature of flows.
 2. Submersible units where an electrical connection is available.
- D. Provide one stand-by pump of each size to be maintained on site.
 1. Installed back-up pumps to be on-line and isolated from the primary system by a valve.
 2. System to meet design conditions with the largest pump out of service.
- E. Provide 24 hour per day monitoring of the by-pass operation and 24-hour per day emergency response to any pump failure or other by-pass pumping system problems.
- F. Provide sound attenuated enclosure.

2.2 PERFORMANCE

- A. Provide bypassing operation for the locations and flows shown below.
- B. Submit bypass system design information in accordance with this specification for each individual required pumping operation.

Location	Min Flow (gpm)	Max Flow (gpm)	Static Head (FT)
Existing Manhole	As Needed	As Needed	As Needed

C. Fuel:

1. Provide all fuel necessary to perform bypass operations specified under this project.

2.3 PUMPS

- A. Provide fully automatic units.

2.4 PIPING

- A. Temporarily construct all discharge systems of rigid pipe with positive, restrained joints or welded HDPE pipe in order to prevent the accidental spillage of flows.
- B. Discharge hose will only be allowed in short sections and by specific permission from the Engineer.
- C. Provide all necessary air release valves for proper operation of the pumping system.
- D. Aluminum "irrigation" type piping or glued PVC pipe will not be allowed.

2.5 ENGINE/PUMP CONTROL SPECIFICATIONS

- A. Start, stop, and control the engine by a high performance state of the art digital controller.
1. Supply by the pump manufacturer.
 2. Provide weather proof enclosure.
 3. Provide an external weatherproof 12-position keypad accessible without the need to remove or open any protective cover or enclosure.
 4. Design to start/stop the engine at a signal supplied by high and low level floats or a 4-20 mA transducer.
 5. Provide the specified functions without modification, factory recalibration, or change of chips or boards, by simply accessing the keypad.
- B. Keypad:
1. Provide a capacitive touch sensing system.
 2. Mechanical switches will not be acceptable.
 3. Capable of operating in extreme temperatures, with gloves, through ice, snow, mud, grease, etc. and maintain complete weather-tight sealing of the PrimeGuard controller.
- C. In automatic mode, the unit shall conserve energy and go to "sleep".
- D. Controller to function interchangeably from float switches, pressure switch, or transducer, as well as manual start/stop by selection at the keypad.
1. No other equipment or hardware changes are required.
- E. Provide automatic throttle control, capable of varying the engine speed to maintain a constant level in a process without a change to the controller other than via the keypad.
- F. Provide programmable start function for three separate functions each day for seven days (i.e. a start, warm up, exercise cycle on two separate days at different times and for a varying length of time all via the keypad).

- G. Provide Manual-Automatic Button:
 - 1. In Manual Mode, manual "Start" button starts engine and runs until "Stop" button is depressed or an emergency shutdown occurs.
 - 2. In Automatic Mode, start/stop sequencing is initiated by either two normally-open narrow angler float switches, pressure switch, transducer, or a signal from a digital input.
- H. Controller to integrate the engine safety shut-off for low and high oil temperature, and provide over-speed protection.
- I. Controller to include standard, field-adjustable parameters for engine cycle crank timer, shutdown time delay, warm-up time delay, and cool-down time delay.
- J. Controller to have only one circuit board with eight built-in relays. Each relay can be named to provide any function, all via the keyplay without changing relays, chips, printed circuits, or any hardware or software.
- K. Standard components to consist of (24) digital inputs, (7) analog inputs, (1) magnetic pick-up input, (8) 20-amp form "C" relays, (1) RS232 port, (1) RS485 port, (1) RS232/RS485 port, (1) J1939 port, and (1) 64X128 pixel full graphic LCD display with backlight.
- L. Controller to withstand Vibration of 3 g, 3 axis, frequency swept 10-1000 Hz, in an operating temperature Range of 4° to 176°F (-20° to 80°C) and an operating humidity range of 0-95% Non-Condensing.
- M. Provide level control device, float switches, transducer, etc., suitable for the bypassing operation.

2.6 SOUND ATTENUATED ENCLOSURE

- A. Reduce pump and engine noise to (68) sixty-eight dBA or less at a distance of thirty feet.
- B. The engine and pump to be completely enclosed with fourteen-gauge sheet metal panels backed with one-inch and two-inch layers of poly-damp acoustical sound-deadening material.
- C. Provide removable panels for easy access to the engine / pump for maintenance and repair.
- D. Provide a locking access door for visual inspection to the engine control panel.
- E. For maintenance and service needs to the pump discharge side of the trailer, provide a hinged door for quick access to the engine oil fill, fuel fill port, oil dipstick, and filters.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL AND MAINTENANCE

- A. Testing:
 - 1. Perform leakage and pressure tests at 150% of design pressure of the bypass pumping discharge piping using clean water prior to actual operation.
 - 2. Notify the Engineer 48 hours prior to testing.

- B. Inspect bypass pumping system as required for fueling and maintenance to ensure that the system is working correctly and provides continuous operation.
- C. Insure that the temporary pumping system is properly maintained and a responsible operator will be on hand at all times when pumps are operating.
- D. Extra Materials:
 - 1. Keep spare parts for pumps and piping on site.
 - 2. Maintain on the site adequate hoisting equipment for each pump and accessories.

3.2 PREPARATION

- A. Precautions
 - 1. Locate any existing utilities in the area the Contractor selects to locate the bypass pipelines.
 - 2. Locate bypass pipelines to minimize any disturbance to existing utilities and obtain approval of the pipeline locations from the Engineer.
 - 3. Protect the Owner's facilities and private property from damage inflicted by bypassing operation.

3.3 INSTALLATION AND REMOVAL

- A. Make connections to the existing facilities and construct temporary bypass pumping system only at the access location indicated on the approved submittal drawings.
- B. Incorporate primary and secondary plugging device on the plugging or blocking of flows.
 - 1. When plugging or blocking is no longer needed for performance and acceptance or work, remove in a manner that permits the flow to slowly return to normal without surge, to prevent surcharging or causing other major disturbances downstream.
- C. Exercise caution and comply with OSHA requirements when working in the presence of sewer gases, combustible oxygen-deficient atmospheres, and confined spaces.
- D. The installation of the bypass pipelines is prohibited in all salt marsh/wetland areas.
 - 1. Locate off streets sidewalks and on shoulders of the roads.
- E. In the event that the bypass pipeline crosses local streets or private driveways, place the bypass pipelines in trenches and cover with temporary pavement. Obtain all approvals for placement of the temporary pipeline within public ways.
- F. System to remain in place and operation until the completion of the initial start up period of the new equipment.
- G. Upon completion of the bypass pumping operations, and after the receipt of written permission from the Engineer, the Contractor will remove all the piping, restore all property to pre-construction condition and restore all pavement.

3.8 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

DIVISION 35
UNDERGROUND UTILITY CONVERSION

3510000 - UTILITY CONDUIT:

(1) GENERAL

(A) DESCRIPTION:

The work covered by this section shall consist of furnishing all material (unless otherwise noted), labor, and equipment required to install all conduit and fittings of the types and sizes specified herein and shown on the Contract Documents or in accordance with these Specifications.

- Contractor to note not all conduits and conduit fittings are shown completely on the Drawings, which are predominately schematic. The Contractor shall provide and install all conduit and conduit fittings indicated or required for the appropriate connection and operation of all services, tie-ins, and equipment requiring such conduit.
- Typical Details depict conduit size and owner. Final equipment locations will be determined based on current and proposed field conditions, such as driveways, landscaping, fences, guardrail, drainage structures, etc.
- Contractor to install utility conduits and fittings for the following utility companies: City of Georgetown Power, Horry Telephone Cooperative, Frontier Communications, Southern Coastal Cable, and Time Warner Cable. The individual utility companies will be responsible for pulling and installing their wires, cables, and equipment unless otherwise stated in the Drawings. The Contractor will have to coordinate with all utility companies to meet their requirements and stub-up conduits at proper locations.
- Southern Coastal Cable and Time Warner Cable will be providing their own material. The Contractor will coordinate with these utility owners to obtain the material in a timely manner. The communication companies have agreed to comply with the schedule, so delays do not occur.
- All existing poles and underground utilities associated with the conversion will remain active and in place until conversion is complete and approved by all parties.
- All communication companies have the right to review the contractor's bid and either accept or reject the costs associated to their individual component. If the

communication company elects to reject the contractor's bid price, then they will perform their own installation of conduit in a location suitable for the project. The communication company will need to coordinate the approved location with SCDOT.

(B) STORAGE AND PROTECTION:

Conduit, fittings, and equipment shall be stored and protected as outlined in the manufacturer's recommendations and the requirements of these Specifications. Conduit shall be stored aboveground and sufficiently supported.

(C) GUARANTEE:

Contractor to provide guarantee against use of defective equipment, materials and workmanship in accordance with the requirements of these Specifications.

(2) MATERIALS

(A) GENERAL

- All primary power conduits shall be buried with at least 4' of cover. If primary power conduits are unable to be installed with 4' of cover, then they must be encased in concrete prior to backfilling and installing the remaining conduits.
- Damaged, dented, flattened, or kinked conduit shall not be used. All exposed ends of conduit shall be plugged or sealed during construction to prevent the entrance of foreign material and moisture into the conduit. Burrs or sharp projections, which may damage the utility cable, shall be removed.
- All conduits shall be rigid non-metallic, unless otherwise shown or specified.
- Polyethylene conduit used for directional drilling of City of Georgetown power conduit shall be black with a red stripe. Do not use the black with red stripe color combination for any other utility conduits. Orange or plain black conduits are acceptable for communication conduits.

(B) RIGID METAL CONDUIT

Rigid metal conduit will be heavy wall, mild steel conduit conforming to ANSI C80.1 and Federal Specification WW-C-581 (Class 1, Type A), hot-dip galvanized both inside and out. All conduits shall bear the approved stamp of the Underwriters Laboratories in conformance with the National Electric Code and shall be manufactured by Republic Steel, General Electric, General Cable, or equivalent.

(C) INTERMEDIATE METAL CONDUIT

Intermediate metal conduit will be intermediate wall, high strength steel conduit conforming to Federal Specification WW-C-581E, hot-dip galvanized both inside and out. All conduits shall bear the approved stamp of the Underwriters Laboratories and shall be approved by the National Electric Code as a direct substitute for rigid metal conduit in all uses and occupancies, including hazardous locations.

(D) RIGID NONMETALLIC CONDUIT

Rigid nonmetallic conduit will be SCH 40 heavy wall polyvinyl chloride (PVC) electrical conduit rated for 90EC conductors and conforming to NEMA TC-2, Type EPC-40-PVC. It shall be listed by Underwriters Laboratories in conformance with the National Electrical Code. Conduit fittings, elbows, and joint cement shall be produced by the same manufacturer as the conduit. Conduits shall be manufactured by Carlon, Borg-Warner, or equivalent.

(E) PLASTIC-COATED RIGID METAL CONDUIT

- Rigid metal conduit prior to application of plastic coating shall conform to Part B, Rigid Metal Conduit, of this section.
- Plastic coating will be polyvinyl chloride (PVC) bonded to the metal a uniform thickness of 40 mils the full length of the conduit except the threads. The bond between the metal and PVC coating shall be equal or greater than the tensile strength of the PVC coating.
- A coupling shall be furnished loose with each length of conduit and shall have a PVC sleeve extending one pipe diameter or 2 inches, whichever is least, beyond the end of the coupling. PVC Elbows shall only be used for communication conduits. Power conduits are to use metal Elbows. Elbow shall have the same thickness of PVC coating as on the conduit. All threaded conduit and elbow ends shall have plastic thread protectors.
- The rigid steel galvanized PVC coated conduit and fittings shall be KorKap as manufactured by Plastic Applicators, Houston, Texas; Plasti-Bond as manufactured by Pittsburgh Std. Div. of Robroy Industries, Verone, Pa.; or equivalent.

(F) BENDS AND SWEEPS

All abrupt changes in direction of a conduit run shall be made with a sweep of the same diameter as the rest of the conduit run, and having the following minimum radii for each conduit size:

Minimum Sweep Radii for Project:

- 1" Conduit- 2' Radius
- 2" Conduit- 3' Radius
- 3" Conduit- 3' Radius
- 4" Conduit- 4' Radius
- 6" Conduit- 4' Radius

All bends, sweeps, and/or elbows will be metal for all power conduits.

(3) EXECUTION

(A) GENERAL

- Minimum size conduit shall be 1 inch except where noted otherwise, and no conduit shall have more than 40 percent of its internal area occupied by conductors.
- During construction, all installed conduits shall be temporarily plugged, capped or otherwise protected from the entrance of dust, trash, moisture, etc. Any conduits which may become clogged will be replaced. No conductor shall be pulled in until all work that might cause damage to the conduit or conductors has been completed.
- Unless otherwise shown or specified, exposed rigid conduit shall be installed parallel or at right angles to structural members, surfaces, and building walls.
- Two or more conduits in the same general routing shall be parallel with symmetrical bends.
- Where groups of conduits terminate together, provide template to hold conduits in proper relation to each other and to building.

(B) INSTALLATION OF RIGID NONMETALLIC CONDUIT

- Field bending of polyvinyl chloride (PVC) conduit shall be made with appropriate equipment. No torches or flame-type devices shall be used.
- When joints are to be made with polyvinyl chloride (PVC) conduit, the conduit shall be cut with a fine-tooth saw and deburred. Conduit ends shall be wiped clean of dust, dirt, and shavings, and shall be dry. Solvent cement shall be applied to bond the joint and the joint shall be watertight.

- Polyvinyl chloride (PVC) conduit shall be installed in accordance with the manufacturer's specifications and recommendations.

(C) INSTALLATION OF UNDERGROUND CONDUIT

- No conduit shall be concealed or encased until the Engineer has inspected the conduit for proper installation and accurate placement.
- The Contractor shall be responsible for all excavating, boring, draining, trench forming of duct assembly, and protective concrete envelope, backfilling, and removal of excess earth.
- Underground conduit shall be installed with a minimum 3-inch per 100-foot downward slope for drainage. Drains shall be provided at all low points.
- Bends and turns shall be made using long sweeps. Ninety-degree and less bends will be used only where required and approved or instructed by the Engineer.
- All underground conduit runs for primary power service shall be at least 48 inches below grade and shall have a minimum conduit separation of 6 inches, unless specifically instructed by the Engineer. Conduit shall have a minimum 6-inch concrete cover on all side if 48 inches of cover cannot be achieved.
- All underground conduit runs shall be rodded, followed by a swab to clean out any obstructions which may cause cable abrasions.
- All underground conduit runs shall be marked by a strip of permanently colored red polyethylene tape, 0.004 inch thick and 6 inches wide, buried above the conduit bank and 12 inches below finished grade.
- After conduits have been installed to their termination point, the Contractor shall install rope into each conduit run, with a tag on the end indicating the owner and size of each conduit. This rope shall be polypropylene, with a minimum tensile strength of 1000 Newtons (240 pounds), which shall remain in place for future use.
- Conduit bends, conduit bodies (condulets), sweeps, pulling boxes, miscellaneous fittings, couplings, adapters, bushings, locknuts, and other items shall be incidental to conduit installation and shall not be measure.

- Pavement repair for all open trench cuts will be included in the conduit installation cost.
- Conduits will be installed by open cut trenching unless otherwise noted or directed by the Engineer. If open cut trenching is not possible, then horizontal directional drilling (HDD) shall be used. See SCDOT Utilities Accommodation Manual Chapter 8 for HDD requirements.
- All trenching operations shall meet the construction requirements instructed in SCDOT Utility Accommodations Manual Chapter 13.

352000 - CABINET, SWITCHGEAR, AND OTHER APPURTENANCES:

(1) GENERAL

(A) DESCRIPTION:

The work covered by this section shall consist of furnishing all labor and equipment required to install items of the types and sizes specified herein and shown on the Contract Documents or in accordance with these Specifications. The electrical system will be provided by the City of Georgetown under a separate contract.

(2) MATERIALS

(A) SWITCHGEAR

- The switchgears shown are for future installation to be performed under a separate contract. The locations shown are to be used to assist stub out locations for the conduits.

(B) CABINETS

- Sectionalizing cabinets will be provided by the City of Georgetown. Coordination with the City to obtain these cabinets will be required.

(C) OTHER APPURTENANCES

- All communication companies' pedestals, hand holes, junction boxes, and/or cabinets will be their responsibility for installation and coordination with the conduit installation.

- Street light junction boxes will be placed at the pole locations shown on the plans. The junction boxes accommodate for standard LED 30-35-foot fiberglass pole street lights, which will be installed at a later date.

(3) EXECUTION

- Contractor to install equipment items as directed by the manufacturer. The sectionalizing cabinets will be provided by the City for the contractor to install.
- Field adjustments could be made to accommodate existing utilities and other surrounding features. Final locations will be approved by the City before final placement or stub out locations.
- Conduits entering and exiting the cabinets shall be installed to accommodate for the future electrical system.