



Fulton County, GA

Department of Purchasing & Contract Compliance

Cecil S. Moore, CPPO, CPPB, CPSM, C.P.M., A.P.P
Director

September 27, 2011

Re: #11ITB80161K-DB; 2011 Standby Miscellaneous Construction – Wastewater System Services

Dear Vendors

Attached is one (1) copy of Addendum 1, hereby made a part of the above referenced #11ITB80161K-DB; 2011 Standby Miscellaneous Construction - Wastewater System Services.

Except as provided herein, all terms and conditions in the RFP referenced above remain unchanged and in full force and effect.

Sincerely,

Darlene A. Banks

Darlene A. Banks, CPPB
Assistant Purchasing Agent

Winner 2000 - 2009 Achievement of Excellence in Procurement Award • National Purchasing Institute



#11ITB80161K-DB

Page 2

This Addendum forms a part of the contract documents and modifies the original Proposal documents as noted below:

Due Date for this project has been changed from Monday, October 3, 2011 to Tuesday, October 11, 2011. Please note; the County will not be accepting any more questions.

Revisions Attached:

Section 00010; Table of Contents

Section 00030; Bid Form

Section 01025; Measurement and Payment

Additions:

Section 02720; Division 2 (Pipe Bursting)

Section 02731; Division 2 (Sewer Rehabilitation)

ACKNOWLEDGEMENT OF ADDENDUM NO. 1

The undersigned bidder acknowledges receipt of this addendum by returning one (1) copy of this form with the proposal package to the Department of Purchasing and Contract Compliance, Fulton County Public Safety Building, 130 Peachtree Street, Suite 1168, Atlanta, Georgia 30303 by **11:00am on Tuesday, October 11, 2011.**

This is to acknowledge receipt of Addendum No. 1 _____ day of _____, 2011.

Legal Name of Bidder

Signature of Authorized Representative

Title

REVISED ATTACHMENTS

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Attachment**FC Standard Details**

BID FORM (REVISED)

Submitted To: Fulton County Government

Submitted By: _____

For: **ITB # 11ITB80161K-DB**
2011 Standby Miscellaneous Construction - Wastewater System Services

Submitted on _____, 20__.

The undersigned, as Bidder, hereby declares that the only person or persons interested in the Bid as principal or principals is or are named herein and that no other person than herein mentioned has any interest in this Bid or in the Contract to be entered into; that this Bid is made without connection with any other person, company or parties making a Bid; and that it is in all respects fair and in good faith without collusion or fraud.

The Bidder further declares that he has examined the site of the work and informed himself fully in regard to all conditions pertaining to the place where the work is to be done; that he has examined the Drawings and Specifications for the work and contractual documents relative thereto, and has read all instructions to Bidders and General Conditions furnished prior to the openings of bids; that he has satisfied himself relative to the work to be performed.

The Bidder proposes and agrees, if this Bid is accepted, to contract with the Board of Commissioners of Fulton County, Atlanta, Georgia, in the form of contract specified, to furnish all necessary materials, equipment, machinery, tools, apparatus, means of transportation and labor necessary, and to complete the construction of the work in full and complete accordance with the shown, noted, and reasonably intended requirements of the Specifications and Contract Documents to the full and entire satisfaction of the Board of Commissioners of Fulton County, Atlanta, Georgia, with a definite understanding that no money will be allowed for extra work except as set forth in the attached General Conditions and Contract Documents for the following prices.

THE BASE BID TOTAL IS THE AMOUNT UPON WHICH THE BIDDER WILL BE FORMALLY EVALUATED AND WHICH WILL BE USED TO DETERMINE THE LOWEST RESPONSIBLE BIDDER. Please make sure that all line items below are accurately calculated and total up to this inclusive amount.

The base bid may not be withdrawn or modified for a period of sixty (60) days following the receipt of bids.

BASE BID TOTAL AMOUNT:

_____ DOLLARS

(\$ _____).

Make sure that all line items below are accurately calculated and total up to the inclusive BASE BID TOTAL amount entered on Page 1.

Method of Bidding

The unit or lump sum price for each of the several items in the Bid of each Bidder shall include its pro rata share of overhead and profit so that the sum of the products, obtained by multiplying the quantity shown for each item by the unit price, represents the total Bid. Any Bid not conforming to this requirement may be rejected. Additionally, Unbalanced Bids or conditional Bids will be subject to rejection. The special attention of all Bidders is called to this provision, for should conditions make it necessary to revise the quantities, no limit will be fixed for such increased or decreased quantities nor extra compensation allowed.

ITEM 1 - CONTRACTOR MOBILIZATION

a.	5	Each	For Each Project Less Than \$25,000	\$ 500/EA	\$ 2,500.00
b.	10	Each	For Each Project \$25,000 to \$75,000	\$ 1000/EA	\$ 10,000.00
c.	7	Each	For Each Project Greater Than \$75,000	\$ 1,500/EA	\$ 10,500.00

ITEM 2 - 8-INCH DIP GRAVITY SEWER

a.	1,000	L.F.	0.0 - 6.0 Foot Depth	\$ _____/L.F.	\$ _____
b.	800	L.F.	6.1 - 12.0 Foot Depth	\$ _____/L.F.	\$ _____
c.	100	L.F.	12.1 - 18.0 Foot Depth	\$ _____/L.F.	\$ _____
d.	100	L.F.	18.1 - 25.0 Foot Depth	\$ _____/L.F.	\$ _____
e.	100	L.F.	Greater than 25 Foot Depth	\$ _____/L.F.	\$ _____
f.	100	L.F.	Installed in 16-inch Steel Casing	\$ _____/L.F.	\$ _____

ITEM 3 - 10-INCH DIP GRAVITY SEWER

a.	1,000	L.F.	0.0 - 6.0 Foot Depth	\$ _____/L.F.	\$ _____
b.	800	L.F.	6.1 - 12.0 Foot Depth	\$ _____/L.F.	\$ _____
c.	200	L.F.	12.1 - 18.0 Foot Depth	\$ _____/L.F.	\$ _____
d.	100	L.F.	18.1 - 25.0 Foot Depth	\$ _____/L.F.	\$ _____
e.	100	L.F.	Greater than 25 Foot Depth	\$ _____/L.F.	\$ _____
f.	100	L.F.	Installed in 18-inch Steel Casing	\$ _____/L.F.	\$ _____

ITEM 4 - 12-INCH DIP GRAVITY SEWER

a.	500	L.F.	0.0 - 6.0 Foot Depth	\$ _____/L.F.	\$ _____
b.	150	L.F.	6.1 - 12.0 Foot Depth	\$ _____/L.F.	\$ _____
c.	100	L.F.	12.1 - 18.0 Foot Depth	\$ _____/L.F.	\$ _____
d.	100	L.F.	18.1 - 25.0 Foot Depth	\$ _____/L.F.	\$ _____
e.	100	L.F.	Greater than 25 Foot Depth	\$ _____/L.F.	\$ _____
f.	100	L.F.	Installed in 20-inch Steel Casing	\$ _____/L.F.	\$ _____

ITEM 5 – PIPE BURSTING

a.	1000	L.F.	Burst 8" to 10" diameter	\$ _____/L.F.	\$ _____
b.	1000	L.F.	Burst 10" to 12" diameter	\$ _____/L.F.	\$ _____
c.	1000	L.F.	Burst 12" to 18" diameter	\$ _____/L.F.	\$ _____

ITEM 6 - HDPE PIPE LINING

a.	1000	L.F.	8" diameter	\$ _____/L.F.	\$ _____
b.	1000	L.F.	10" diameter	\$ _____/L.F.	\$ _____
c.	1000	L.F.	12" diameter	\$ _____/L.F.	\$ _____

ITEM 7 – CURED IN PLACE PIPE LINING

a.	1000	L.F.	8" diameter	\$ _____/L.F.	\$ _____
b.	1000	L.F.	10" diameter	\$ _____/L.F.	\$ _____
c.	1000	L.F.	12" diameter	\$ _____/L.F.	\$ _____

ITEM 8 – SERVICE LINE RECONNECTIONS

a.	40	Each	By excavation for HDPE, pipe bursting, or CIPP 0 to 10' depth	\$ _____/EA	\$ _____
b.	20	Each	By excavation for HDPE, pipe bursting, or CIPP greater the 10' depth	\$ _____/EA	\$ _____
c.	20	Each	By internal reinstatement for CIPP	\$ _____/EA	\$ _____

ITEM 9 – 4-FOOT DIAMETER MANHOLE REHABILITATION – SPRAY ON CEMENTIOUS LINER

a.	200	V.F.	Up to 5' manhole depth	\$ _____/VF	\$ _____
b.	200	V.F.	6' to 10' manhole depth	\$ _____/VF	\$ _____
c.	100	V.F.	11' to 15' manhole depth	\$ _____/VF	\$ _____
d.	100	V.F.	15' to 20' manhole depth	\$ _____/VF	\$ _____
e.	80	V.F.	Greater than 20' manhole depth	\$ _____/VF	\$ _____

ITEM 10 - 6-INCH DIP SEWER SERVICE CONNECTIONS

a.	500	L.F.	On New Sewer Main	\$ _____/L.F.	\$ _____
b.	500	L.F.	On Existing Sewer Main	\$ _____/L.F.	\$ _____
c.	300	L.F.	From New Manhole	\$ _____/L.F.	\$ _____
d.	300	L.F.	From Existing Manhole	\$ _____/L.F.	\$ _____
e.	25	Each	Clean-out Assembly - Complete	\$ _____/EA	\$ _____

ITEM 11 - 4-FOOT DIAMETER PRECAST MANHOLE

a.	50	V.F.	0.0 - 6.0 Foot Depth	\$ _____/V.F.	\$ _____
b.	50	V.F.	6.1 - 12.0 Foot Depth	\$ _____/V.F.	\$ _____
c.	18	V.F.	12.1 - 18.0 Foot Depth	\$ _____/V.F.	\$ _____
d.	20	V.F.	18.1 - 25.0 Foot Depth	\$ _____/V.F.	\$ _____
e.	30	V.F.	Greater than 25 Foot Depth	\$ _____/V.F.	\$ _____

ITEM 12 - 4-FOOT DIAMETER DOGHOUSE MANHOLE

a.	50	V.F.	0.0 - 5.0 Foot Depth	\$ _____/V.F.	\$ _____
b.	50	V.F.	5.1 - 10.0 Foot Depth	\$ _____/V.F.	\$ _____
c.	18	V.F.	10.1 - 15.0 Foot Depth	\$ _____/V.F.	\$ _____
d.	20	V.F.	15.1 - 20.0 Foot Depth	\$ _____/V.F.	\$ _____
e.	30	V.F.	Greater than 20 Foot Depth	\$ _____/V.F.	\$ _____

ITEM 13 - MANHOLE ACCESSORIES

a.	5	Each	Safety Platform	\$ _____/EA	\$ _____
b.	10	Each	Standard Ring and Cover	\$ _____/EA	\$ _____
c.	10	Each	Standard Ring and Cover - Traffic Rated	\$ _____/EA	\$ _____
d.	5	Each	Boltdown Watertight Ring and Cover	\$ _____/EA	\$ _____
e.	5	Each	Hinged (Pamrex or equivalent) Ductile Iron Ring and Cover	\$ _____/EA	\$ _____

ITEM 14 - MANHOLE MODIFICATIONS

a.	6	Each	Adjust Existing Manhole Cover to Grade (In Pavement)	\$ _____/EA	\$ _____
b.	6	Each	Adjust Existing Manhole Cover to Grade (Out of Pavement)	\$ _____/EA	\$ _____
c.	6	V.F.	Adjust Existing Precast Manhole	\$ _____/V.F.	\$ _____
d.	6	V.F.	Adjust Existing Brick Manhole	\$ _____/V.F.	\$ _____

ITEM 15 - MANHOLE CONNECTIONS

a.	4	Each	8-Inch Inside Drop Connection	\$ _____/EA	\$ _____
b.	4	Each	8-Inch Outside Drop Connection	\$ _____/EA	\$ _____
c.	5	Each	8-Inch Core and Boot	\$ _____/EA	\$ _____
d.	5	Each	10-Inch Core and Boot	\$ _____/EA	\$ _____
e.	5	Each	12-Inch Core and Boot	\$ _____/EA	\$ _____

ITEM 16 - BORE AND JACK CASING

a.	100	L.F.	16-Inch Steel Casing With 8-Inch DIP Carrier Pipe	\$ _____/L.F.	\$ _____
b.	100	L.F.	18-Inch Steel Casing With 10-Inch DIP Carrier Pipe	\$ _____/L.F.	\$ _____
c.	100	L.F.	20-Inch Steel Casing With 12-Inch DIP Carrier Pipe	\$ _____/L.F.	\$ _____

ITEM 17 - FREE BORE / DIRECTIONAL DRILL

a.	200	L.F.	With 8-Inch DIP	\$ _____/L.F.	\$ _____
b.	100	L.F.	With 10-Inch DIP	\$ _____/L.F.	\$ _____
c.	100	L.F.	With 12-Inch DIP	\$ _____/L.F.	\$ _____
d.	100	L.F.	With 8-Inch HDPE	\$ _____/L.F.	\$ _____
e.	100	L.F.	With 10-Inch HDPE	\$ _____/L.F.	\$ _____
f.	100	L.F.	With 12-Inch HDPE	\$ _____/L.F.	\$ _____

ITEM 18 - STORM DRAIN PIPE

a.	20	L.F.	12-Inch RCP	\$ _____/L.F.	\$ _____
b.	20	L.F.	12-Inch CMP	\$ _____/L.F.	\$ _____
c.	20	L.F.	15-Inch RCP	\$ _____/L.F.	\$ _____
d.	20	L.F.	15-Inch CMP	\$ _____/L.F.	\$ _____
e.	20	L.F.	18-Inch RCP	\$ _____/L.F.	\$ _____
f.	20	L.F.	18-Inch CMP	\$ _____/L.F.	\$ _____

ITEM 19 - EROSION AND SEDIMENTATION CONTROL

a.	5	Each	Construction Exits	\$ _____/EA	\$ _____
b.	3,000	L.F.	Reinforced Silt Fence (Type C)	\$ _____/L.F.	\$ _____
c.	300	Each	Hay Bale Check Dams	\$ _____/EA	\$ _____
d.	40	Each	Stone Check Dams	\$ _____/EA	\$ _____
e.	20	Each	Inlet Sediment Traps	\$ _____/EA	\$ _____
f.	100	Each	Pigs-in-a-Blanket	\$ _____/EA	\$ _____
g.	50	S.Y.	Rip Rap with Filter Fabric Underlay	\$ _____/S.Y.	\$ _____
j.	500	C.Y.	Rip Rap	\$ _____/C.Y.	\$ _____
h.	40	Each	Box Gabion (Surge Stone Fill with Filter Fabric Underlay) - 3' x 3' x 6' Baskets	\$ _____/EA	\$ _____
i.	1,000	L.F.	Tree Protection Fence	\$ _____/L.F.	\$ _____

ITEM 20 - VEGETATION RESTORATION

a.	3,000	S.Y.	Temporary Seeding (All Types)	\$ _____/S.Y.	\$ _____
b.	3,000	S.Y.	Permanent Seeding (All Types)	\$ _____/S.Y.	\$ _____
c.	1,000	S.Y.	Sod Grassing (All Types)	\$ _____/S.Y.	\$ _____
d.	1,000	S.Y.	Hydroseeding	\$ _____/S.Y.	\$ _____

ITEM 21 - TEMPORARY STREAM CROSSING - FOR CONTRACTOR ACCESS

a.	5	Each	Up To 15-Feet From Top of Bank to Top of Bank	\$ _____/EA	\$ _____
b.	3	Each	15 to 25-Feet From Top of Bank to Top of Bank	\$ _____/EA	\$ _____
c.	1	Each	25 to 40-Feet From Top of Bank to Top of Bank	\$ _____/EA	\$ _____
d.	1	Each	Over 40-Feet From Top of Bank to Top of Bank	\$ _____/EA	\$ _____

ITEM 22 - TEMPORARY STREAM CROSSING - PIPELINE CROSSES STREAM

a.	5	Each	Up To 15-Feet From Top of Bank to Top of Bank	\$ _____/EA	\$ _____
b.	3	Each	15 to 25-Feet From Top of Bank to Top of Bank	\$ _____/EA	\$ _____
c.	1	Each	25 to 40-Feet From Top of Bank to Top of Bank	\$ _____/EA	\$ _____
d.	1	Each	Over 40-Feet From Top of Bank to Top of Bank	\$ _____/EA	\$ _____

ITEM 23 - TRENCH EXCAVATION AND STABILIZATION – AS ORDERED BY THE ENGINEER

a.	500	C.Y.	Trench Stabilization With Suitable Earth Materials	\$ _____/C.Y.	\$ _____
b.	500	C.Y.	Trench Stabilization With Crusher Run	\$ _____/C.Y.	\$ _____
c.	500	C.Y.	Trench Stabilization With Crushed Stone (#57)	\$ _____/C.Y.	\$ _____
d.	100	C.Y.	Trench Stabilization With M-10 Sand	\$ _____/C.Y.	\$ _____
e.	250	C.Y.	Trench Rock Excavation and Removal – Base Cost	\$ 40.00 / C.Y.	\$ _____
f.	250	C.Y.	Trench Rock Excavation and Removal – Premium Cost	\$ _____/C.Y.	\$ _____

ITEM 24 - EASEMENT CLEARING AND GRUBBING

a.	2,000	L.F.	Clear 20-Foot Wide Easement - Light	\$ _____/L.F.	\$ _____
b.	2,000	L.F.	Clear 20-Foot Wide Easement - Medium	\$ _____/L.F.	\$ _____
c.	2,000	L.F.	Clear 20-Foot Wide Easement - Heavy	\$ _____/L.F.	\$ _____

ITEM 25 - DRIVEWAY AND ROAD REPAIR AND REPLACEMENT

a.	50	S.Y.	Gravel Driveway Replacement	\$ _____/S.Y.	\$ _____
b.	60	S.Y.	Asphalt Driveway Replacement	\$ _____/S.Y.	\$ _____
c.	100	S.Y.	Concrete Driveway Replacement – Residential	\$ _____/S.Y.	\$ _____
d.	100	S.Y.	Concrete Driveway Replacement - Commercial	\$ _____/S.Y.	\$ _____
e.	100	S.Y.	Concrete Sidewalk	\$ _____/S.Y.	\$ _____
f.	200	L.F.	Concrete Curb and Gutter	\$ _____/L.F.	\$ _____
g.	100	L.F.	Granite Curb	\$ _____/L.F.	\$ _____
h.	200	S.Y.	Asphalt Pavement Removal and Replacement (Type A Cut Repair)	\$ _____/S.Y.	\$ _____
i.	2,000	S.Y.	Complete Fulton County Standard Utility Cut (Type C Cut Repair)	\$ _____/S.Y.	\$ _____
j.	10,000	S.Y.	Road Surface Milling	\$ _____/S.Y.	\$ _____
k.	10,000	S.Y.	Road Surface Overlay	\$ _____/S.Y.	\$ _____

ITEM 26 - PAVEMENT MARKING AND STRIPING

a.	10	L.F.	4- or 5-Inch Std. DOT Striping - Thermoplastic	\$ _____/L.F.	\$ _____
b.	10	L.F.	4- or 5-Inch Std. DOT Striping - Paint	\$ _____/L.F.	\$ _____
c.	10	L.F.	Std. DOT Stop Bar - Thermoplastic	\$ _____/L.F.	\$ _____
d.	10	L.F.	Std. DOT Stop Bar - Paint	\$ _____/L.F.	\$ _____

ITEM 27 - TRAFFIC CONTROL

a.	400	L.F.	Std. DOT Concrete Barrier	\$ _____/L.F.	\$ _____
b.	20	Each/Day	MUTCD Std. Safety Barrel	\$ _____/EA/DY	\$ _____
c.	80	Hours	Police Cruiser	\$ _____/HR	\$ _____
d.	80	Hours	Certified Flagman	\$ _____/HR	\$ _____
e.	80	Hours	Light Plant	\$ _____/HR	\$ _____
f.	10	Days	Electronic Message Board	\$ _____/DY	\$ _____

ITEM 28 - REMOVE AND REPLACE EXISTING FENCE

a.	20	L.F.	4-Foot High Chain Link	\$ _____/L.F.	\$ _____
b.	20	L.F.	6-Foot High Chain Link	\$ _____/L.F.	\$ _____
c.	20	L.F.	6-Foot High Wood	\$ _____/L.F.	\$ _____

ITEM 29 - CAST IN PLACE CONCRETE

a.	20	V.F.	Concrete Piers	\$ _____/V.F.	\$ _____
b.	40	C.Y.	General Concrete Placement	\$ _____/C.Y.	\$ _____
c.	100	C.Y.	Concrete – Flowable Fill	\$ _____/C.Y.	\$ _____

ITEM 30 - PROGRAMMABLE ELECTRONIC MARKING DEVICES

a.	100	Each	Line Marker Balls - 3M 1424-XR-ID	\$ _____/EA	\$ _____
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ITEM 31 - UTILITY LOCATION – EXCAVATION AND BACKFILL

a.	60	Hours	Soft Dig Hydro Excavation	\$ _____/HR	\$ _____
b.	200	C.Y.	Exploratory Excavation	\$ _____/C.Y.	\$ _____

ITEM 32 - CASH ALLOWANCES

a.	Soils, Concrete, Asphalt, and Materials Testing				\$ 20,000.00
b.	Utility Conflict Resolution				\$ 20,000.00
c.	Large Tree Removal (18-Inch Diameter and Above)				\$ 20,000.00
d.	Bypass Pumping (Specialty Contractor)				\$ 20,000.00
e.	Preblast Survey/Inspection and Blasting Monitoring				\$ 20,000.00

ITEM 33 - EMERGENCY SERVICES

The following labor and equipment are included for when the County needs manpower or additional equipment to assist in making emergency repairs other than those specified above as unit price items. Hourly rate items below shall **NOT** apply when work is performed under non-emergency conditions. The Notice to Proceed for each project will indicate emergency or non-emergency project status.

a.	20	Hours	Sewer Superintendent	\$ _____/HR	\$ _____
			Sewer Crew Truck - Fully Equipped with tools and repair parts including but not limited to pipe saw, wacker-packer, chain saw, and miscellaneous hand tools, including sewer foreman and three laborers.	\$ _____/HR	\$ _____
b.	20	Hours			
c.	20	Hours	Rubber Tired Front End Loader With Trailer and Operator	\$ _____/HR	\$ _____
d.	20	Hours	Rubber Tired Backhoe With Trailer and Operator	\$ _____/HR	\$ _____
e.	20	Hours	Excavator With Trailer and Operator	\$ _____/HR	\$ _____
f.	20	Hours	Trench Compactor With Operator	\$ _____/HR	\$ _____
g.	20	Hours	Mobile Air Compressor With Hoses and Air Tools (Jackhammer, Pavement Breaker, Clay Spade, etc.)	\$ _____/HR	\$ _____

The Bidder agrees hereby to commence work under this Contract, with adequate personnel and equipment, on a date to be specified in a written order of the Contracting Officer and to fully complete all work under this Contract within the agreed upon days specified in a written Notice To Proceed for each project.

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

Fulton County reserves the right to award this contract to one or more qualified vendors. The amount of each contract that is issued will be a portion of the overall bid total based on available funding.

In case of discrepancies between the figures shown in the unit prices and the totals, the unit prices shall apply and the totals shall be corrected to agree with the unit prices. In case of discrepancies between written amounts and figures, written amounts shall take precedence over figures and the sum of all Bid extensions (of unit prices) plus lump sum items shall take precedence over BID TOTAL.

The Bidder furthermore agrees that, in the case of a failure on his part to execute the Contract Agreement and Bonds within ten (10) days after receipt of conformed contract documents for execution, the Bid Bond accompanying his bid and the monies payable thereon shall be paid into the funds of the Owner as liquidated damages for such failure.

Enclosed is a Bid Bond in the approved form, in the sum of: _____

_____ Dollars

(\$ _____) according to the conditions of "Instructions to Bidders" and provisions thereof.

The undersigned acknowledges receipt of the following addenda (list by the number and date appearing on each addendum) and thereby affirms that its Bid considers and incorporates any modifications to the originally issued Bidding Documents included therein.

ADDENDUM # _____ DATED _____

Part 1 General**(REVISED)****1.01 Scope**

- A. The Bid lists each item of the Project for which payment will be made. **No payment will be made for any items other than those listed in the Bid.**
- B. Required items of work and incidentals necessary for the satisfactory completion of the work which are not specifically listed in the Bid, and which are not specified in this Section to be measured or to be included in one of the items listed in the Bid, shall be considered as incidental to the work. All costs thereof, including Contractor's overhead costs and profit, shall be considered as included in the unit prices bid for the various Bid items. The Contractor shall prepare the Bid accordingly.
- C. Work includes furnishing all labor, equipment, tools and materials, which are not furnished by the Owner and performing all operations required to complete the work satisfactorily, in place, as specified and as indicated on the Drawings.

1.02 Descriptions

- A. Measurement of an item of work will be by the unit indicated in the Bid.
- B. Final payment quantities shall be determined from actual quantities installed and measured in the field.
- C. Payment will include all necessary and incidental related work not specified to be included in any other item of work listed in the Bid.
- D. Unless otherwise stated in individual sections of the Specifications or in the Bid, or as approved in writing by the Engineer prior to beginning the work, no separate payment will be made for any item of work, materials, parts, equipment, supplies or related items required to perform and complete the work. The costs for all such items required shall be included in the price bid for item of which it is a part. In the event that the Engineer requests Work that is agreed by both the Engineer and the Contractor as not included in the Bid, that item of work will be paid for at actual cost (invoices required) plus 10% markup.
- E. Payment will be made by extending unit prices multiplied by quantities provided and then summing the extended prices to reflect actual work. Such price and payment shall constitute full compensation to the Contractor for furnishing all plant, labor, equipment, tools and materials not furnished by the Owner and for performing all operations required to provide to the Owner the entire Project, complete in place, as specified and as indicated on the Drawings.
- F. "Products" shall mean materials or equipment permanently incorporated into the work.
- G. "Provide" shall mean furnish and install.

1.03 Non Payments

- A. No separate payment shall be made for the restoration of developed property and the cost shall be included in the overall prices for the execution of the work unless specifically noted otherwise.

- B. No separate payment shall be made for excavation, disposal of rubbish and debris, pipe bedding, backfill, dewatering of trench, repair of damaged properties. All testing required for the execution of the work shall be done as part of the price for the item involved.
- C. No separate payment shall be made for any traffic control, work area protection, recording, safety measures, set-up of equipment and set-up of staging area except as indicated below. Payment for these items shall be part of the unit price bid for each particular item of work.
- D. No separate payment shall be made for providing detail surveys needed for construction. The Contractor shall be responsible in providing further survey necessary to complete the Work. The Contractor shall carefully preserve the established points, and in case of willful or careless destruction, the Contractor shall be responsible for the costs of reestablishing the bench marks, reference points and stakes.

1.04 Contractor Mobilization

All costs associated with mobilization of all required resources, a one time cost for each non-emergency project assigned by the Owner, shall be included in the unit prices bid for CONTRACTOR MOBILIZATION, based on the project sizes listed in the Bid.

1.05 Sewers and Accessories

- A. Existing Utilities and Obstructions
 - 1. Horizontal Conflict: Payments for conflicts with existing utilities shall be made only where additional manholes, fittings, and/or additional lengths of pipe are approved by the Engineer. Said payment shall be made at the unit prices in the Bid. No other payment will be made for any delay or extra cost encountered by the Contractor due to protection, avoidance or relocation of existing utilities, mains or services or changing the horizontal alignment of the sewer.
 - 2. Vertical Conflict: Where authorized by the Engineer, payment for additional depth of cut required to avoid vertical conflicts shall be made at the unit prices bid for sewer line. No payment will be made for relocation of existing utilities except as authorized by the Engineer..
- B. Location and Grade: No separate payment shall be made for survey work performed by or for the Contractor in the establishment of reference points, bench marks, cut sheets, limits of right of way or easement, including their restoration, as well as centerline or baseline points.
- C. Construction Along Highways, Streets and Roadways: No separate payment shall be made for traffic control or maintaining highways, streets, roadways and driveways, except as authorized by the Engineer.
- D. Ductile Iron Pipe Gravity Sewer
 - 1. Payment for ductile iron pipe gravity sewer shall be made at the unit price bid for GRAVITY SEWER, for the quantity and type provided at the appropriate depth. Payment will be made at the one unit price for the actual depth of the sewer line.

2. Measurement for payment at the unit price for GRAVITY SEWER shall be made along the centerline of the pipe, through fittings, from centerline of manhole to centerline of manhole or to inside face of structure wall penetrated. Depth of cut shall be measured from pipe invert to ground level at pipe centerline. Cut sheets prepared by the Contractor and approved by the Engineer shall be the basis for payment.
 3. The unit price bid for GRAVITY SEWER shall include all costs for installation of the sewer as required including, but not limited to, materials, labor, excavation, dewatering, shoring, bedding, haunching, backfill, compaction, clean-up, testing, and all other related items not listed as separate items in the Bid.
 4. Payment for pipe INSTALLED IN STEEL CASING will be made in addition to payment for gravity sewer installed at the appropriate depth. The unit price bid for pipe INSTALLED IN STEEL CASING shall include all additional costs associated with providing the appropriate size steel casing pipe, spacers, grout, brick, as required for the complete installation of pipe in casing via open-cut installation. All costs associated with installation of the sewer line, including excavation, dewatering, etc. shall be included in the unit price bid for GRAVITY SEWER.
 5. No payment shall be made for sections of pipe which are not installed.
 6. No additional payment shall be made for replacement of defective materials.
 7. No additional payment will be made for maintaining or stopping flow while placing the new sewer in service.
 8. No payment shall be made for sections of pipe which have not passed required tests, or if the area has not been cleaned up to the satisfaction of the Engineer.
 9. No separate payment will be made for cutting and beveling pipe.
 10. The cost of all fittings shall be included in the price bid for pipe.
- E. Clean up and Testing: No separate payment shall be made for clean up and testing.
- F. Pipe Bursting
1. Measurement for payment at the unit price for PIPE BURSTING shall be made along the centerline of the pipe from centerline of manhole to centerline of manhole or to inside face of structure wall penetrated.
 2. No separate payment shall be made for launch pits or receiving pit.

- G. HDPE Pipe Lining
1. Measurement for payment at the unit price for HDPE PIPE LINING shall be made along the centerline of the pipe from centerline of manhole to centerline of manhole or to inside face of structure wall penetrated.
- H. CURED-IN-PLACE Lining
1. Measurement for payment at the unit price for CURED-IN-PLACE LINING shall be made along the centerline of the pipe from centerline of manhole to centerline of manhole for actual lengths of new pipe installed. No payment shall be made for "down-tube" or dry felt used in conjunction with an inversion.
- I. Sewer Cleaning
1. No payment shall be made for normal cleaning of sewers as defined in Section 02731, paragraph 3.04 I
- J. Manhole Rehabilitation
1. Measurement for payment at the unit price for MANHOLE REHABILITATION shall be made from the invert to the base of the manhole frame for each method of rehabilitation bid at the price for the depth range listed.

1.06 Sewer Service Connections

- A. The unit price bid for 6-INCH DIP SEWER SERVICE CONNECTIONS shall include all costs associated with installing a service connection as listed in the Bid including, but not limited to, all materials, labor, tools, excavation, backfill, compaction, manhole coring, grouting, manhole boot, fittings including wye or tee, and all incidental items required for a complete installation. No additional payment will be made for plugging the fitting or for cutting an existing sewer pipe to locate the fitting.
- B. Measurement for payment for service connections will be made along the centerline of the pipe, through fittings, from centerline of manhole or pipe to the inside face of the clean-out box.
- C. The unit price bid for CLEAN-OUT ASSEMBLY shall include, but is not limited to, all materials, labor, tools, fittings, vertical pipe, cleanout, cast iron box and cover, and all incidental items as required to provide a complete clean-out assembly.
- D. Payment for re-establishing sewer service connections shall be made under the unit prices bid for SERVICE LINE RECONNECTIONS.

1.07 Precast Concrete Manholes and Accessories

- A. The unit price bid for 4-FOOT DIAMETER PRECAST MANHOLES, at the depths listed in the Bid, shall include all costs associated with construction of a complete manhole on a new sewer line, including excavation, shoring, dewatering,

backfilling, compaction, crushed stone bedding, concrete slab, precast base, riser sections, cone or flat top, coring, rubber boots, grouting, sleeves, concrete, invert, mastic sealant, brickwork, mortar, connection of pipes to the manhole, vacuum testing, and all incidental items required to complete the installation.

- B. The unit price bid for 4-FOOT DIAMETER DOGHOUSE MANHOLES, at the depths listed in the Bid, shall include all costs associated with construction of a complete manhole on an existing sewer line, including excavation, shoring, dewatering, backfilling, compaction, crushed stone bedding, concrete slab, base, riser sections, cone or flat top, coring, rubber boots, grouting, concrete, invert, diversion of flow, cutting existing pipe, connecting pipes to manhole, mastic sealant, brickwork, mortar, vacuum testing, and all incidental items required to complete the installation.
- C. Measurement for payment at the unit price for MANHOLES shall be made from the invert to the top of the top section. Payment for manholes shall be made at the unit price bid for MANHOLES, for the type provided at the appropriate depth. Payment will be made at the one unit price for the actual depth of the manhole.
- D. Manhole Accessories
1. The unit price bid for SAFETY PLATFORM shall include all costs associated with installation of a safety platform in a new precast concrete manhole. Payment for SAFETY PLATFORM will be in addition to payment for PRECAST MANHOLE.
 2. The unit price bid for MANHOLE RING AND COVER shall include the cost of providing the appropriate type ring and cover on a new manhole or new riser section including materials, labor, grouting, brick and mortar, minor grade adjustments (up to three inches either way vertically) and all incidental items required to complete the installation.
- E. Manhole Modifications
1. The unit price bid for ADJUST EXISTING MANHOLE COVER TO GRADE shall include all costs associated with adjusting an existing manhole cover by up to three inches using steel or concrete adjusting rings or brick and mortar, as ordered by the Engineer, including pavement repair if applicable. Measurement for payment will be made based on the actual quantity of manhole covers adjusted.
 2. The unit price bid for ADJUST EXISTING PRECAST MANHOLE shall include all costs associated with raising or lowering an existing manhole including, but not limited to, excavation, shoring, dewatering, backfilling, compaction, removal and replacement of existing cone or flat top, removal or addition of riser sections, disposal of removed materials, grouting, steps, brickwork, mortar, mastic and all incidental items required to complete the installation. In the event that a new cone or flat top section is required, it will be paid for at the unit price bid for 4-FOOT DIAMETER PRECAST MANHOLE.
 3. The unit price bid for ADJUST EXISTING BRICK MANHOLE shall include all costs associated with raising or lowering an existing manhole including, but not limited to, excavation, shoring, dewatering, backfilling, compaction, removal or addition of brick, disposal of removed materials,

- grouting, steps, mortar, and all incidental items required to complete the installation.
4. Payment for pavement patching associated with ADJUST EXISTING MANHOLE shall be paid for at the unit price bid for FULTON COUNTY STANDARD UTILITY CUT.
 5. Measurement for payment for ADJUST EXISTING MANHOLE will be made from the original manhole cover elevation to the proposed elevation of the new manhole cover. Vertical distance will be measured to the nearest tenth of a foot.
- F. Manhole Connections: The unit price bid for MANHOLE CONNECTIONS shall include all costs associated with connecting a new sewer line to an existing manhole, including drop connection fittings, tees, or core and boot as appropriate for the type of connection, flow diversion, penetration of manhole wall, sealing connection, forming new invert, and all incidental items required to complete the connection. Costs for excavation, shoring, dewatering, backfilling, compaction, and bedding shall be included in the unit price bid for GRAVITY SEWER.
- G. Measurement for payment for drop connection vertical pipe shall be made from the invert of the upstream sewer to the invert of the manhole. Payment for the measured vertical feet of pipe will be made for the unit price bid for GRAVITY SEWER. Inside drop connection vertical piping will be paid for at the 0.0 to 6.0 foot depth price for gravity sewer. Outside drop connection vertical piping will be paid for based on the actual depth of the of the drop connection.

1.08 Bore and Jack Casings

- A. The unit price bid for BORE AND JACK CASING shall include all costs associated with installation of the casing pipe and carrier pipe, including but not limited to excavation, shoring, dewatering, backfilling, compaction, steel casing pipe, ductile iron sewer pipe, spacers, grout, brick, and other accessories, for installing the pipe complete in place.
- B. Payment for casing shall be made only at the completion of all work specified for the casing installation. No partial payment shall be made for the construction of the casing without carrier pipe.
- C. Measurement for payment shall be made along the centerline of the pipe line to the limits of bore and jack as ordered by the Engineer.
- D. Casing pipe may be included in Partial Payment Requests as stored materials, if, in the opinion of the Engineer, the casing pipe is stored and properly protected at the Project site. Casing pipe which has been properly installed, but has not yet been paid for as installed casing, may also be included as stored materials.
- E. Payment for pipe in casing shall be made only at the completion of all work specified for the pipe installation. Payment for pipe in the casing shall be made only at the one unit price bid for BORE AND JACK CASING.
- F. In the event that rock is encountered during the installation of the pipe casing which, in the opinion of the Engineer, cannot be removed through the casing then the Engineer may authorize the Contractor to complete the crossing by another method via a change order.

- G. No additional payment shall be made for rock excavation through the casing.
- H. The unit price bid shall assume that all jack and bore casing installations exceed 60 feet in length.

1.09 Free Bore / Directional Drill

- A. Payment for installation of sewer pipe via either free bore or directional drill installation methods shall be made at the unit price bid for FREE BORE / DIRECTIONAL DRILL for the appropriate size and type of pipe installed to the limits ordered by the Engineer. The unit price bid shall include all costs for construction of the pipe via free bore or directional drilling methods in lieu of open cut, including but not limited to excavation, shoring, dewatering, backfilling, compaction, carrier pipe, and other accessories, for installing the pipe complete in place.
- B. The unit price bid for FREE BORE / DIRECTIONAL DRILL shall include all costs for free bore failures and the subsequent bore and jack installation if required as well as for bore and jack casing if the Contractor elects to provide the casing in lieu of free bore.
- C. Measurement for payment shall be made along the centerline of the pipe installed, to the limits for free bore or directional drill ordered by the Engineer.

1.10 Storm Drain Pipe Installation

- A. The unit price bid for STORM DRAIN PIPE shall include all costs associated with the installation or replacement of the appropriate size and type of storm drain piping associated with construction of a gravity sewer, where directed by the Engineer. Costs for excavation, shoring, dewatering, backfilling, compaction, and bedding shall be included in the unit price bid for GRAVITY SEWER.
- B. Measurement for payment will be made along the centerline of the storm drain pipe installed.
- C. No separate payment will be made for support of existing pipe when installing new sewer line over or under existing storm water piping. All costs for support shall be included in the unit price bid for GRAVITY SEWER.
- D. Costs for removing and replacing existing storm water pipe for ease of construction when installing new sewer line shall be included in the unit price bid for GRAVITY SEWER. Payment for storm drain pipe will only be made where removal or replacement is approved or ordered by the Engineer prior to removal.

1.11 Erosion and Sedimentation Control

- A. General
 - 1. No separate payment shall be made for erosion and sedimentation controls, except as noted below. All other erosion and sedimentation

- control costs shall be included in the unit price bid for the item to which it pertains.
2. No payment will be made for any portion of the Project for which temporary erosion and sedimentation controls are not properly maintained.
 3. Quantities for payment shall be based upon actual quantity constructed by the Contractor.
- B. Construction Exits: All costs for construction exits, including installation, maintenance, repair, and removal, shall be included in the unit price bid for CONSTRUCTION EXITS. The unit price bid shall include geotextile underliner, stone, and all incidental costs associated with maintaining a construction exit to Fulton County standards.
1. If the action of the construction vehicles traveling over the gravel pad does not sufficiently remove mud and debris, the vehicle tires shall be washed prior to allowing vehicles to enter public right-of-way. No additional payment will be made for the cost of washing tires.
 2. No payment will be made for construction exits that are improperly constructed or use materials that are not approved.
- C. Reinforced Silt Fence: All costs for Type C silt fence, where ordered by the Engineer, including installation, maintenance, repair, replacement, and removal, shall be included in the unit price bid for REINFORCED SILT FENCE.
- D. Hay Bale Check Dams: All costs for hay bale check dams, including hay bales, necessary earthwork, staking, periodic maintenance and repair, and removal of sediment and hay bales following establishment of permanent erosion control measures shall be included in the unit price bid for HAY BALE CHECK DAMS.
- E. Stone Check Dams: All costs for stone check dams, including stone, geotextile underliner, necessary earthwork, periodic maintenance and repair, and removal of sediment and stone following establishment of permanent erosion control measures shall be included in the unit price bid for STONE CHECK DAM. Measurement for payment will be made to the limits allowed in accordance with the Standard Details and Specifications..
- F. Inlet Sediment Traps: All costs for temporary inlet sediment traps (silt box), including installation, maintenance, repair and removal, shall be included in the unit price bid for INLET SEDIMENT TRAPS.
- G. Pigs-in-a-Blanket: All costs for pigs in a blanket, including installation, maintenance, repair and removal, shall be included in the unit price bid for PIGS-IN-A-BLANKET.
- H. Rip Rap With Filter Fabric Underlay: All costs for rip rap, including filter fabric, installation, maintenance, repair and removal, as required by the Standard Details and Specifications, or as directed by the Engineer, shall be included in the unit price bid for RIP RAP WITH FILTER FABRIC UNDERLAY.
- J. Rip Rap: All costs for rip rap, excluding RIP RAP WITH FILTER FABRIC UNDERLAY, installation, maintenance, repair and removal, as required by the

Standard Details and Specifications, or as directed by the Engineer, shall be included in the unit price bid for RIP RAP.

- K. Box Gabion – 3'x3'x6' Baskets: All costs for box gabions, including stone, wire mesh, stakes, anchors, filter fabric, assembly of box gabion, placement, excavation, backfill, compaction, and all incidental costs shall be included in the unit price bid for BOX GABION.
- L. Tree Protection Fence: All costs for tree protection fence, also known as orange mesh safety fence, including installation, maintenance, repair and removal, shall be included in the unit price bid for TREE PROTECTION FENCE.

1.12 Vegetation Restoration

- A. Temporary Seeding: Temporary seeding and mulching shall be applied to all disturbed area to be left exposed for a period greater than 14 days, or as ordered by the Engineer. The unit price bid for TEMPORARY SEEDING shall include all costs associated with spreading fast growing seed, mulching, watering, maintenance and repair until permanent grassing is established.
- B. Permanent Seeding: All costs for permanent seeding, including fine grading, raking, soil preparation (removal of rocks and other objectionable materials), sowing the appropriate type of grass seed, fertilizing, mulching, watering, temporary protective measures, maintenance and repair until permanent grassing is established, shall be included in the unit price bid for PERMANENT SEEDING. Permanent seed will be applied only after final grading and dress-up of disturbed area have been completed to the satisfaction of the Engineer.
- C. Sod Grassing: Where ordered by the Engineer, sod shall be provided at the unit price bid for SOD GRASSING for any type. All costs for proper installation, including preparation of surface, installation, rolling, compacting, watering, maintenance, repair, and any temporary measures required to protect the sod until establishment, shall be included in the unit price bid for SOD GRASSING.
- D. Hydroseeding: All costs for hydroseeding, including preparation of surface, maintenance, repair, and any temporary measures required to protect the area until establishment, shall be included in the unit price bid for HYDROSEEDING.
- E. In no case shall any one area be paid more than once for temporary grassing or for permanent grassing.
- F. If an area is temporarily grassed, and as directed by the Engineer the area is left that way permanently, no additional payment will be made for permanent grassing.
- G. Measurement for payment will be made by square yard, along the sewer centerline, to the widths allowed by the Standard Details and Specifications.

1.13 Temporary Stream Crossing

- A. Temporary Stream Crossing: All costs for constructing temporary stream crossings, whether for contractor access to the work or for work crossing streams, shall be included in the unit price bid for TEMPORARY STREAM CROSSING. All labor and materials including temporary culverts, stone, filter fabric underlay, check dams, bypassing, necessary earthwork, periodic maintenance and repair, and removal of sediment and all materials placed by the

Contractor, following the end of the usefulness of the temporary crossing, shall be included in the unit prices bid for TEMPORARY STREAM CROSSING.

- B. Stream Crossings shall be constructed as shown in the Standard Details and Specifications, limited to 10 feet upstream and 10 feet downstream from top of trench excavation and from five feet beyond top of bank, across stream or ditch bank and bottom, to five feet beyond top of bank. Any other areas at streams or ditches disturbed by the Contractor, which may require rip rap, shall be rip rapped at no additional cost to the Owner.

1.14 Trench Excavation and Stabilization

- A. No separate or additional payment will be made for any special or unique method, means, techniques or equipment necessary for the Contractor's compliance with the Specifications, regulatory requirements, permits, laws or regulations which govern this Project.
- B. Trench Excavation: No separate payment will be made for trench excavation. All costs shall be included in the unit price bid for the item to which it pertains at the appropriate depth.
- C. Sheet piling, Bracing and Shoring: No separate payment will be made for providing any sheet piling, bracing and shoring. All costs shall be included in the unit price bid for the item to which it pertains at the appropriate depth.
- D. Dewatering Excavations: All costs of equipment, labor and materials required for dewatering shall be included in the price bid for the item to which it pertains.
- E. Trench Foundation and Stabilization
 - 1. No payment for trench stabilization shall be authorized until after the trench has been dewatered. If the pipe is installed in an inadequately prepared trench bottom, the Engineer shall notify the Contractor in writing of the deficiency and will not authorize payment for that portion of that length of pipe which was improperly installed.
 - 2. Payment for trench stabilization shall be made on the basis of the amount authorized and the unit price bid for TRENCH STABILIZATION. Payment shall include all costs for the removal and disposal of the unsuitable material and replacement with the materials listed in the Bid including filter fabric. No additional payment will be made for material required for specified bedding.
- F. Bedding and Haunching
 - 1. The unit price bid for pipe for GRAVITY SEWER shall include excavation of the trench to the depth below the pipe necessary to provide specified bedding and to lay the sewer to grade. Measurements for payment will be made only to the pipe invert.
 - 2. No separate payment will be made for material used to provide specified bedding. The cost of all bedding materials shall be included in the unit price bid for the item to which it relates, except for trench stabilization.
 - 3. No additional payment will be made for improved bedding required to compensate for over excavation of the trench.

G. Trench Rock Excavation

1. Rock excavation shall be paid for in addition to payment for normal pipe excavation accounted for in the unit price bid for gravity sewer. Payment will be made for the measured quantity of rock excavated, at the sum of the unit prices for Trench Rock Base Cost and Trench Rock Premium Cost if applicable.
2. The unit price for Trench Rock Base Cost is for the normally anticipated cost of rock excavation, the cost of additional bedding and backfill material as specified and all costs incidental thereto.
3. The unit price bid for Trench Rock Premium Cost shall be for all additional costs for rock excavation which, in the opinion of the Contractor, are in excess of the Base Cost, including but not limited to extra blasting protection, closer grouping of blasting holes, more detonator caps, more caution, etc. The Contractor shall not bid less than zero (bid a deduct) for the Trench Rock Premium Cost. Any Bids containing a deduct will be declared non-responsive and rejected by the Owner.
4. The maximum allowable volume of rock excavation for payment shall be based on a trench width equal to the outside diameter of the pipe barrel plus 18 inches, but not less than 36 inches, and depth of rock on the pipe centerline, from the top of the rock to the bottom of the rock or the specified bottom of the trench, whichever has the higher elevation.
5. The Engineer must be given reasonable notice to measure all rock. Payment will not be made for excavated rock that was not measured and approved by the Engineer prior to removal.
6. No allowance shall be made for excavating to extra widths for construction of manholes or other appurtenances, for excavating to sloping sides, or for excavations made necessary by the physical limitations of the Contractor's equipment. Cost of such additional rock excavation shall be included in the unit price bid for the item to which it pertains.
7. Payment for blasting monitoring shall be made from the BLASTING MONITORING cash allowance. A fee must be agreed upon by the Engineer prior to the Contractor employing an independent, qualified specialty subcontractor to monitor the blasting. If the Contractor employs the specialty subcontractor prior to the Engineer's approval of the fee, all such costs are subject to non reimbursement.

H. Initial Backfill

1. No separate payment shall be made for initial backfill.
2. No separate payment shall be made for drying out the initial backfill material in order to meet the compaction requirements.
3. No separate payment shall be made for the adding of moisture to the initial backfill materials in order to meet the compaction requirements.

4. No separate payment shall be made for providing select material if the insitu material cannot meet the compaction requirements.
- I. Concrete Encasement: Payment for concrete encasement shall be at the unit price in the Bid for GENERAL CONCRETE PLACEMENT.
 - J. Final Backfilling
 1. No additional payment will be made for additional material when excavated materials are used.
 2. No separate payment shall be made for drying out the final backfill material in order to meet the compaction requirements.
 3. No separate payment shall be made for the adding of moisture to the final backfill materials in order to meet the compaction requirements.
 4. No additional payment will be made for providing select material if the insitu material cannot meet the compaction requirements.
 - K. Additional Material: No separate payment will be made for additional earth or fill materials imported to the Project site.

1.15 Easement Clearing and Grubbing

- A. The unit price bid for EASEMENT CLEARING AND GRUBBING shall include all costs associated with clearing a 20-foot wide easement of the specified type, as approved by the Engineer prior to clearing, including but not limited to removal and disposal of trees, stumps, roots, undergrowth, debris, or other objectionable matter.
- B. LIGHT CLEARING shall be defined by an easement that is dense with shrubs, brush, and trees up to one foot in diameter.
- C. MEDIUM CLEARING shall be defined by an easement that is dense with shrubs, brush, and trees averaging one to two feet in diameter.
- D. HEAVY CLEARING shall be defined by an easement that is dense with shrubs, brush, and trees averaging over two feet in diameter, including specimen trees.
- E. The cost of moving and reestablishing landscape features, including labor and materials, shall be included in the unit price bid for the item to which it pertains.
- F. No payment will be made for clearing and grubbing in grassed areas and in areas with non-established vegetation. The costs associated with such clearing shall be included in the unit price bid for the item to which it pertains.

1.16 Driveway and Road Repair and Replacement

- A. General:
 1. Payment for removing and replacing driveway and road asphalt and concrete pavement will be made based on the measured quantity replaced at the unit price Bid. The unit price bid shall include all costs associated with cutting, removing, disposing of existing pavement, replacing and compaction of base, subbase, concrete, asphalt, and all

- related items as required, including providing select backfill if necessary, all traffic control and temporary measures for maintaining traffic.
2. Payment shall be made only for that length for which the pipeline is constructed underneath or within four feet of the edge of the pavement to a width as shown in the Standard Details and Specifications.
 3. Payment for soils testing shall be made from the SOILS, CONCRETE, ASPHALT, AND MATERIALS TESTING cash allowance. No payment shall be made for tests that fail to verify required results.
 4. No additional payment will be made for removing and replacing damaged adjacent pavement.
 5. No additional payment will be made for saw cutting of driveways or curbs.
- B. Payment for removing and replacing gravel driveways will be made based on the measured quantity replaced at the unit price Bid for GRAVEL DRIVEWAY. The unit price bid shall include all costs associated with removing, replacing, and compacting a minimum of four-inches of GAB or #57 stone, and all related items as required for a complete driveway repair, including all traffic control and temporary measures for maintaining access. Payment will be made for the length for which the pipeline is constructed underneath the driveway and for the width as limited by the Standard Details and Specifications.
- C. Payment for removing and replacing asphalt driveways will be made based on the measured quantity replaced at the unit price Bid for ASPHALT DRIVEWAY. The unit price bid shall include all costs associated with cutting, removing existing pavement, disposing of removed materials, compacting and placing a minimum of four inches of GAB and one and a half inches of Type E asphalt, and all related items as required for a complete driveway repair, including all traffic control and temporary measures for maintaining access. Payment will be made for the length for which the pipeline is constructed underneath the driveway and for the width as limited by the Standard Details and Specifications.
- D. Payment for removing and replacing concrete driveways will be made based on the measured quantity replaced at the unit price Bid for CONCRETE DRIVEWAY - RESIDENTIAL. The unit price bid shall include all costs associated with cutting, removing existing concrete, disposing of removed materials, compacting sub base, and placing a minimum of four inches concrete with reinforcing steel, and all related items as required for a complete driveway repair, including all traffic control and temporary measures for maintaining access. Payment will be made for the length for which the pipeline is constructed underneath the driveway and for the width to the nearest construction joint on either side of the new pipeline.
- E. Payment for removing and replacing asphalt driveways will be made based on the measured quantity replaced at the unit price Bid for CONCRETE DRIVEWAY - COMMERCIAL. The unit price bid shall include all costs associated with cutting, removing existing concrete, disposing of removed materials, compacting sub base, and placing a minimum of six inches concrete with reinforcing steel, and all related items as required for a complete driveway repair, including all traffic control and temporary measures for maintaining access. Payment will be made for the length for which the pipeline is constructed underneath the driveway and for the width to the nearest construction joint on either side of the new pipeline.

- F. Payment for removal and replacement of sidewalk shall be made at the unit price bid for CONCRETE SIDEWALK. No payment for sidewalk shall be made where the centerline of the new pipe is more than 5-feet from the closest edge of the sidewalk.
- G. Payment for removal and replacement of curb and gutter shall be made at the unit prices bid for CONCRETE CURB AND GUTTER or for GRANITE CURB as appropriate. No payment for curb and gutter shall be made where the centerline of the new pipe is more than 5-feet from the closest edge of the curb and gutter.
- H. Payment for removal and replacement of asphalt pavement (Type A Cut Repair), where the Fulton County Standard Utility Cut (Type C Cut Repair) is not required, shall be made at the unit price bid for ASPHALT PAVEMENT REMOVAL AND REPLACEMENT. The unit price bid shall include all costs associated with a Type A Cut Repair, including cutting, removing existing pavement, disposing of removed materials, compacting and placing a minimum of six inches of crusher run and one and a half inches of Type E asphalt, and all related items as required for a complete repair, including all traffic control and temporary measures. Payment will be made for the length for which the pipeline is constructed underneath the roadway and for the width as limited by the Standard Details and Specifications, or as approved by the Engineer.
- I. Payment for Fulton County Standard Utility Cut (Type C Cut Repair) shall be made at the unit price bid for COMPLETE FULTON COUNTY STANDARD UTILITY CUT. The unit price bid shall include all costs associated with cutting, removing existing pavement, disposing of removed materials, eight inch concrete cap, bituminous tack coat, and one and a half inches of Type E asphalt, and all related items as required for a complete repair, including all traffic control and temporary measures including road plates. Payment will be made for the length for which the pipeline is constructed underneath the roadway and for the width as limited by the Standard Details and Specifications, or as approved by the Engineer.
- J. No separate or additional payment shall be made for temporary measures required to make the road or driveway surface passable, including backfilling the top of the trench temporarily with crusher run or granular material or placing a temporary asphalt topping.
- K. Payment for milling shall be made at the unit price bid for ROAD SURFACE MILLING. The unit price bid shall include all costs associated with milling one and a half inches of existing pavement and disposing of all waste materials and all related items as required. Measurement shall be made based on actual area milled, as approved by the Engineer.
- L. Payment for overlay shall be made at the unit price bid for ROAD SURFACE OVERLAY. The unit price bid shall include all costs associated with overlaying a road surface with a bituminous tack coat and a minimum of one and a half inches of Type E asphalt, and all related items as required. Measurement shall be made based on actual area overlaid, as approved by the Engineer.

1.17 Pavement Marking and Striping

- A. The unit price bid for PAVEMENT MARKING AND STRIPING shall include all costs associated with applying standard DOT striping and paint as listed in the

Bid and as ordered by the Engineer. All required materials, labor, tools, equipment, and traffic control shall be included in the unit price bid.

1.18 Traffic Control

- A. All costs for providing traffic control in compliance with the Manual on Uniform Traffic Control Devices (MUTCD) and Georgia Department of Transportation (GDOT) specifications shall be included in the unit price bid for the item to which it pertains. No additional payment will be made for complying with MUTCD or GDOT requirements.
- B. Payment for TRAFFIC CONTROL as indicated in the Bid will be made only for additional traffic control devices as ordered by the Engineer.
- C. The unit price bid for STANDARD DOT CONCRETE BARRIER shall include all costs for providing, installing and removing a standard DOT concrete barrier, as directed by the Engineer.
 - 1. No excavation in or near roadways will be left open over night. Therefore, all concrete barriers will be required to be removed from the roadway and moved to a location where vehicular and pedestrian traffic are not obstructed. The cost of moving the barriers as such shall be included in the unit price bid.
 - 2. Measurement for payment shall be made based on the actual linear footage of barrier installed, per day, approved by the engineer and serving the purpose for which it was intended. Payment will not be made for excess barriers stored by the Contractor in any location.
- D. The unit price bid for MUTCD STANDARD SAFETY BARREL shall include all costs for providing, installing and removing a standard MUTCD safety barrel, as directed by the Engineer. Only safety barrels directed by the Engineer, in addition to those required by the MUTCD and GDOT, shall be paid for separately.
- E. The unit price bid for POLICE CRUISER shall include all costs for providing a police cruiser for additional traffic control. Payment will be made for hours spent on site, which may be a portion of a standard work day. Payment will be made only for hours documented and approved by the Engineer.
- F. The unit price bid for CERTIFIED FLAGMAN shall include all costs for providing a flagman for additional traffic control, as directed by the Engineer, in addition to the requirements of MUTCD and GDOT.
 - 1. The flagman shall be certified and dedicated to maintaining and directing traffic flow. An individual who works part time as a flagman and part time as a laborer or acts in dual capacity will not be approved for payment under this item. Proof of certification may be required by the Engineer prior to acceptance for payment.
 - 2. Payment will be made for hours spent on site performing dedicated flagman duties, which may be a portion of a standard work day. Payment will be made only for hours documented and approved by the Engineer.

- G. The unit price bid for LIGHT PLANT shall include all costs for providing a light plant, including generator and lighting system, for night work, as directed by the Engineer.
- H. The unit price bid for ELECTRONIC MESSAGE BOARD shall include all costs for providing an electronic message board, as directed by the Engineer.

1.19 Remove and Replace Existing Fence

- A. The unit price bid for REMOVE AND REPLACE EXISTING FENCE shall include all costs associated with removing and replacing an existing fence of the type and material listed in the Bid, including disposing of waste materials, restoration of site to original condition, and all other associated work for a complete installation.

1.20 Cast in Place Concrete

- A. The unit price Bid for CONCRETE PIERS shall include all costs associated with installation of concrete piers under sewer line including excavation, backfill, compaction, dewatering, drilling grout holes, grouting dowels in place, concrete, reinforcement, and all other work required for pier installation. Measurement for vertical height of the piers shall include the thickness of the footing.
- B. The cost of services of the consulting soil and foundation engineer will be paid by the Contractor from the SOILS, CONCRETE, ASPHALT, AND MATERIALS TESTING cash allowance.
- C. The unit price bid for GENERAL CONCRETE PLACEMENT shall include all costs of placing general concrete as directed by the Engineer. General concrete placement shall only be used for concrete in addition to items listed elsewhere in the Bid.
- C. The unit price bid for CONCRETE – FLOWABLE FILL shall include all costs of filling abandoned pipes with concrete as directed by the Engineer. Flowable fill shall only be used for concrete in addition to items listed elsewhere in the Bid.

1.21 Programmable Electronic Marking Devices

- A. The unit price bid for PROGRAMMABLE ELECTRONIC MARKING DEVICES shall include the cost of providing the marking devices including programmer/locator as specified, including programming the devices and placing them along the sewer line. The cost of excavation shall be included in the unit price bid for GRAVITY SEWER or UTILITY LOCATION. Measurement for payment will be based on the quantity installed as directed by the Engineer.

1.22 Utility Location – Excavation and Backfill

- A. Soft Dig Hydro Excavation: The unit price bid for SOFT DIG HYDRO EXCAVATION shall include all costs associated with locating the assigned utility, excavating to directly above the pipe, measuring the depth, diameter and type of the pipe, backfilling and compacting the hole up to two feet from existing grade with soil, encoding a 3M ID marker device, installing the marker above the pipe at a depth of two feet, and backfilling with soil and dressing the disturbed area with like surrounding materials.

- B. Where utility location is performed in roadways or sidewalks, other materials may be required for backfill. Select materials will be paid for at the unit prices bid for TRENCH STABILIZATION. Measurement for payment will be made on the actual quantity of material used for backfill of the hole where the marker ball is installed.
- C. Exploratory Excavation: The unit price bid for EXPLORATORY EXCAVATION shall include all costs associated with excavation of an area by machine and by hand where necessary with the intent of locating a Fulton County utility, including all equipment, tools, and labor. The costs associated with removal and replacement of roadway, driveway, sidewalk, or curb and gutter shall be included under the appropriate pay item. Measurement for payment will be based on the actual amount of excavation required to locate a Fulton County utility, only when ordered by the Engineer. This item shall not be used for standard locating of utilities as required to perform the work.
- D. No payment will be made for excavation that does not locate the assigned utility, or where the marker ball is not installed directly above the pipe.
- E. No separate or additional payment will be made for any special or unique method, means, techniques or equipment necessary for the Contractor's compliance with these Specifications, regulatory requirements, permits, laws or regulations which govern this Project.

1.23**Cash Allowances**

- A. General
 - 1. The Contractor shall include in the Bid Total all allowances stated in the Contract Documents. These allowances shall cover the net cost of the services provided by a firm selected by the Owner. The Contractor's handling costs, labor, overhead, profit and other expenses contemplated for the original allowance shall be included in the items to which they pertain and not in allowances.
 - 2. No payment will be made for nonproductive time on the part of testing personnel due to the Contractor's failure to properly coordinate testing activities with the work schedule or the Contractor's problems with maintaining equipment in good working condition. The Contractor shall make all necessary excavations and shall supply any samples of materials necessary for conducting compaction and density tests.
 - 3. No payment shall be provided for services that fail to verify required results.
- B. Should the net cost be more or less than the specified amount of the allowance, the Contract will be adjusted accordingly by change order. The amount of change order will not recognize any changes in handling costs at the site, labor, overhead, profit and other expenses caused by the adjustment to the allowance.
- C. Documentation
 - 1. Submit copies of the invoices with each periodic payment request from the firm providing the services.
 - 2. Submit results of services provided which verify required results.

D. Schedule of Cash Allowances

1. Soils, Concrete, Asphalt, and Materials Testing: Allow the amount provided in the Bid for the services of a geotechnical engineering firm and testing laboratory to verify soils conditions including trench excavation and backfill, asphalt coring and density tests, testing of concrete cylinders for poured in place concrete, pipe materials, and similar issues as directed by the Engineer. Services will be reimbursed at direct cost, Contractor must provide invoices for Owner approval.
2. Utility Conflict Resolution: Allow the amount specified in the Bid to resolve any unforeseen utility conflicts (including relocating and/or replacement) as directed and approved by the Engineer.
3. Large Tree Removal: Allow the amount specified in the Bid for the services of a tree removal specialist to remove individual trees as directed by the Engineer. Services will be reimbursed at direct cost plus 10%, Contractor must provide invoices for Owner approval. No payment will be made for trees removed as part of clearing and grubbing.
4. Bypass Pumping: Allow the amount specified in the Bid for the services of a bypass pumping specialty contractor to provide bypass pumping services as directed and approved by the Engineer. Services will be reimbursed at direct cost plus 10%, Contractor must provide invoices for Owner approval. Costs for bypass pumping will be reimbursed only with prior approval of the Engineer. If bypass pumps are provided without prior Engineer approval, payment may not be made for services at the discretion of the Engineer.
5. Blasting Monitoring: Allow the amount provided in the Bid for the services of an independent, qualified specialty subcontractor to monitor the blasting, when directed by the Engineer. Services will be reimbursed at direct cost, Contractor must provide invoices for Owner approval.

1.24 Emergency Services

- A. The following labor and equipment are included in the Bid for when the County needs manpower or additional equipment to assist in making emergency repairs other than those specified above as unit price items. Hourly rate items below shall **NOT** apply when work is performed under non-emergency conditions. The Notice to Proceed for each project will indicate emergency or non-emergency project status.
- B. The unit price bid for the following items shall include all costs for providing the specified personnel on an hourly basis as required by the Owner. Payment may be made for partial work days where applicable. All overhead and direct costs, including all mobilization costs, for providing the labor, equipment, tools, supplies associated shall be included. Separate payments for items not included shall be agreed to prior to providing such items. No payment will be made for additional services provided without proper written notification to the Owner that the services being requested are additional.

1. Sewer Superintendent
2. Sewer Crew Truck - Fully Equipped with tools and repair parts including but not limited to pipe saw, wacker-packer, chain saw, and miscellaneous hand tools, including sewer foreman and three laborers.
3. Rubber Tired Front End Loader With Trailer and Operator
4. Rubber Tired Backhoe With Trailer and Operator
5. Excavator With Trailer and Operator
6. Trench Compactor With Operator
7. Mobile Air Compressor With Hoses and Air Tools (Jackhammer, Pavement Breaker, Clay Spade, etc.)

END OF SECTION

ADDITIONS

Section 02720 Pipe Bursting

1.01 Scope

A. This specification shall cover the rehabilitation of existing gravity sanitary sewers. Pipe Bursting is a system by which the burster unit splits the existing pipe while simultaneously installing a new polyethylene pipe. The new pipe may be of the same size or larger size. The work also involves the reconnection of the existing sewer service house connections, television inspection of the polyethylene pipe and completion of the installation in accordance with the contract documents.

B. Only pneumatically operated equipment with either front or rear expanders for the proper connection to the polyethylene pipe will be allowed for use. Exception to this requirement will only be considered where a static burster unit is proposed for use on isolated segments of pipeline that are to be burst closely adjacent to building foundations or other sensitive structures and where pneumatic bursting might be detrimental. The pneumatic burster must be used in conjunction with a constant tension hydraulic twin capstain winch of either 20, 10 or 5 tons, the size of the winch depends on the diameter of the pipe to be replaced. In no case is the constant tension on the winch to exceed 20 tons.

1.02 Qualifications

A. The Contractor shall be certified by the pipe bursting system patent owner, Britishgas – PLC (BG-PLC), U.S. Patent 4738565, that such a company is a fully trained and licensed user of the pipe bursting system.

B. Polyethylene pipe jointing shall be performed by personnel trained in the use of butt-fusion equipment and recommended methods for new pipe connections. Personnel directly involved with installing the new pipe shall receive training in the proper methods for handling and installing the polyethylene pipe. Training shall be performed by a qualified representative.

C. Contractor shall hold the County and Engineer harmless in any legal action resulting from patent infringements.

D. Contractor or pipe bursting subcontractor shall have:

Minimum experience of 150,000 L.F. of pipe bursting existing gravity sanitary sewer pipe and replacing with polyethylene pipe within the last three years,

AND

Minimum experience of 10,000 L.F. of pipe bursting replacement experience with polyethylene pipe two sizes greater than the host pipe, e.g. 10-inch to 15-inch diameter, 12-inch to 18-inch diameter, etc, in the last three years.

1.03 Standard Specifications

A. Except as otherwise indicated in this Section, the Contractor shall comply with the latest edition of the Standard Specifications for Fulton County Public works Construction together with the latest adopted editions of the Regional and Fulton County Supplement Amendments, especially concerning the reconstruction of manholes and cleanouts.

B. Except as otherwise indicated, the current editions of the following apply to the work of this Section:

ASTM D 1248 Polyethylene Plastics Molding and Extrusion Materials

1.04 Regulatory Requirements

A. The work of this Section shall comply with the current versions, with revisions, of OSHA 29 CFR 1910.146 (permit-required confined-space regulations).

B. All work and testing shall comply with the applicable Federal codes, including Federal Occupational Safety and Health Act of 1970 and the Construction Safety Act of 1969, as amended, and applicable state and local codes and standards; and to the extent applicable with the requirements of the Underwriter's Laboratories, Inc. and the National Electric Code.

1.05 Responsibility for Overflows or Spills

A. It shall be the responsibility of the Contractor to schedule and perform his work in a manner that does not cause or contribute to incidence of overflows or spills of sewage from the sewer system.

B. In the event that the Contractor's work activities contribute to overflows or spills, the Contractor shall immediately take appropriate action to contain and stop the overflow, clean up the spillage, disinfect the area affected by the spill, and notify the designated Construction Manager in a timely manner.

C. Contractor will indemnify and hold harmless the County for any fines or third-party claims for personal or property damage arising out of a spill or overflow that is fully or partially the responsibility of the Contractor, including the legal, engineering and administrative expenses of the County in defending such fines and claims.

1.06 Submittals

A. Submit the following in accordance with the requirements of Section 01340 of these Specifications

1. Shop drawings, catalog data, and manufacturer's technical data showing complete information on material composition, physical properties, and dimensions of new pipe and fittings. Include manufacturer's recommendations for handling, storage, joint welding and repair of pipe and fittings damaged.
2. Methodology for construction and restoration of existing sewer service connections.
3. Detail drawings and written descriptions of the entire construction procedure to install pipe, bypass sewerage flow and reconnection of sewer service connections, restoration of manhole base and provision for facilitating watertight junction of new pipe to existing and reconstructed manholes.
4. Certification of workmen trained for welding and installing pipe.
5. Pre and post upgrade CCTV inspection reports and videotapes. Post upgrade reports and videotapes shall be made after pipe installation and re-connection of all laterals and immediately prior to the commissioning stage.
6. Written certification that the Contractor is an approved BG-PLC licensee of the pneumatic bursting system from T.T. Technologies or approved equal.
7. An initial schedule shall be submitted at the preconstruction meeting by the Contractor. The schedule submitted at the preconstruction meeting and subsequent (half way through project) schedule submitted during the course of the project shall show at a minimum
 - a. each site operation requiring the use of separate crew of equipment and/or labor as a separate activity

- b. the assumed limitations upon the sequence of activities and the anticipated start and completion time for the activities in weeks, numbered from the date of the Notice to Proceed of the project
 - c. the number, nature and size of the plant and/or labor teams which it is anticipated shall be used on each activity
 - d. a description of the proposed methods of construction as well as the nature and extent of temporary works
 - e. the critical path of activities required to complete the whole of the works
 - f. list of all subcontractors including the identification of the task and number of personnel.
8. After the initial schedule is submitted, and the end of each week until contact completion has been reached, the Contractor shall submit a report in writing comprising:
- a. a list of those activities shown on the current schedule which were begun during the week stating their remaining duration's and their anticipated completion times
 - b. a list of those activities begun previously upon which work continued during the week and their anticipated completion times
 - c. a list of those activities begun previously but upon which no work was carried out during week stating their remaining duration's in weeks and their anticipated completion times
 - d. a list of activities completed during the week
 - e. If the anticipated completion time of any activity reported is later than that previously reported or where not previously reported later than the completion time shown on the current schedule the circumstances which in the opinion of the Contractor have caused the anticipated delay shall be stated. Any other matters not previously reported which in the opinion of the Contractor may cause delay to the current schedule shall be described. The current schedule is the revised schedule last produced and submitted to the Construction Manager or where no revised schedule has been submitted the latest revision of the initial schedule submitted.

Part 2 Products

2.01 Materials

A. Polyethylene Plastic Pipe shall be high density solid wall polyethylene pipe and meet the applicable requirements of ASTM F714 Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter, ASTM1248, ASTM D3550.

1. Sizes of the insertions to be used shall be such to renew the sewer to greater flow capacity.
2. All pipes shall be made of virgin material. No reworked material shall be used except that obtained from the manufacturer's own production of the same formulation.
3. The pipe shall be homogenous throughout and shall be free of visible cracks, discoloration, pitting, varying wall thickness, holes, foreign material, blisters, or other deleterious faults.

4. Dimensions and Ratios: The minimum wall thickness of the polyethylene pipe shall be SDR 17 throughout. Where required by Engineer, pipes may be tested at ground surface for circularity before installation and welding commences. Circularity will be checked by pulling a closed cylindrical mandrel through the polyethylene pipe. The mandrel shall be at least three times the diameter of the pipe in length and not greater than inside diameter of pipe minus 2 millimeters. Pipes will be rejected which have greater than 5% deformation due to thermal softening.
5. Material color shall be black. Interior of pipe shall have a light reflective color to allow easier/better viewing for television inspection.
6. Manufacturer shall be Chevron, Phillips 66 Driscopipe or equal.

2.02 Delivery, Storage, and Handling

- A. Transportation, handling, and storage of the polyethylene pipe and fittings shall be as recommended by manufacturer.
- B. If new pipe and fittings become damaged before or during installation, it shall be repaired as recommended by the manufacturer or replaced as required by the Engineer at the Contractor's expense, before proceeding further.
- C. Deliver, store and handle other materials as required to prevent damage.

2.03 Testing

- A. Contractor shall be furnish samples and material tests for compliance with this specification from an independent laboratory to verify the required physical properties and characteristics of supplied materials in accordance with the applicable ASTM Specification. A certificate shall be furnished by the manufacturer, upon request, for all material furnished under this specification. Polyethylene plastic pipe and fittings that do not meet any of the requirements of this specification may be rejected. The Owner shall pay for tests on pipe material which meets specification requirements. Contractor shall pay for failed tests and re-testing of failed materials

2.04 Equipment

- A. The pipe bursting tool shall be designed and manufactured to force its way through existing pipe materials by fragmenting the pipe and compressing the old pipe sections into the surrounding soil as it progresses. The bursting unit shall be pneumatic and shall generate sufficient force to burst and compact the existing pipe line. See manufacturer's specifications for what size tool should be used in what diameter of pipe, as well as parameters of what size tool for percentage of upsize allowed.
- B. The pipe bursting tool shall be pulled through the sewer by a winch located at the upstream manhole. The bursting unit shall pull the polyethylene pipe with it as it moves forward. The bursting head shall incorporate a shield/expander to prevent collapse of the hole ahead of the PE pipe insertion. The pipe bursting unit shall be remotely controlled.
- C. The pipe bursting tool shall be pneumatic unless static is specified. The bursting action of the tool shall increase the external dimensions sufficiently, causing breakage of the pipe at the same time expanding the surrounding ground. This action shall not only break the pipe but also create the void into which the burster can be winched and enables forward progress to be made. At the same time the polyethylene pipe, directly attached to the sleeve on the rear of the burster, shall also move forward.
- D. The burster shall have its own forward momentum while being assisted by winching. A hydraulic winch shall give the burster friction by which it can be move forward. To form a complete operating system, the burster must be matched to a constant tension hydraulic winching system.

2.05 Winch Unit

- A. A winch shall be attached to the front of the bursting unit. The winch shall provide a constant tension to the burster in order that it may operate in an efficient manner. The winch shall ensure directional stability in keeping the unit on line.
- B. The winch shall be of the constant tension type but shall be fitted with a direct reading load gauge to measure the winching load which must automatically be maintained at a constant tension at a set tonnage reading. The winch, which shall be hydraulically operated to provide the constant tension throughout the bursting operation, shall supply sufficient cable in one continuous length so that the pull may be continuous between approved winching points.
- C. The winch, cable and cable drum must be provided with safety cage and supports so that it may be operated safely without injury to persons or property.
- D. The Contractor shall provide a system of guide pulleys and bracing at each manhole to minimize cable contact with the existing sewer between manholes.
- E. The supports to the trench shoring in the insertion pit shall remain completely separate from the winch boom support system and shall be so designed that neither the pipe nor the winch cable shall be in contact with them.

Part 3 Execution

3.01 Sewer Service Connections

- A. All sewer service connections shall be identified and located prior to pipe insertion. The complete list of service laterals, included relevant footage and diameter of lateral, shall be submitted prior to pipe bursting to the Construction Manager for information. Upon commencement, pipe insertion shall be continuous and without interruption from one manhole to another, except as approved by the engineer and/or his representative. Upon completion of insertion of the new pipe, the Contractor shall complete the reconnection of all service laterals on the segment within 24 hours of commencing pipe bursting, to minimize any inconvenience to customers.
- B. The preferred method of saddle connection to the main line shall be either by use of an Inserter Tee by Fowler Manufacturing, Oregon, or by fusion of saddle connection with one of the following approved systems:
1. Electrofusion saddles as manufactured by Central Plastics
 2. Conventional Fusion saddles as manufactured by Central Plastics, Phillips Driscopipe, or Plexco
- C. Saddle material shall be compatible with that of the main pipe.

3.02 Existing Flow

- A. The Contractor shall provide bypass pumping during the pipe bursting/replacement process. The pumps and bypass lines shall be of adequate capacity and size to handle all flows including peak wet weather flow. All costs for bypass pumping, required during installation of the pipe shall be included in the cost for pipe replacement by pipe bursting.
- B. The Contractor shall be responsible for maintaining continuous sanitary sewer service to each and every property connected to the segment of sewer subject to pipe bursting operations. The cost of dealing with tanking, by pass pumping and all other private service flow management shall be included in the rate for pipe replacement.
- C. If sewage backup occurs and enters buildings, the Contractor shall be responsible for clean-up, disinfection, repair, property damage as well as all resultant costs and claims.

3.03 Pre-Installation CCTV Inspection

A. Pipelines shall be televised (CCTV) in conformance with the Fulton County Manual for Internal Sewer Condition Assessment.

CCTV inspection conditions shall include the following:

1. Preconstruction video tapes shall be available for viewing by the Construction Manager before construction begins and throughout the project.
2. Video tapes to remain property of the County. Contractor to retain second copy for his use.
3. All flows tributary to reach of sewer being inspected are to be completely bypassed around the reach during preconstruction inspection if necessary and required by the County.
4. Should any portion of the inspection tapes be of inadequate quality or coverage, as determined by the County, the Contractor shall have the portion re-inspected and video taped at no additional expense to the County.

3.04 Construction Method

A. Equipment used to perform the work shall be located away from buildings in order to minimize noise impact which under all circumstances shall be less than 70 dB unless otherwise allowed by the Engineer due to circumstances beyond the Contractor or pipe bursting subcontractor. A silent engine compartment with the winch shall be provided to reduce machine noise.

B. The Contractor shall install all pulleys, rollers, bumpers, alignment control devices and other equipment required to protect existing manholes, and to protect the polyethylene pipe from damage during installation. Lubrication may be used as recommended by the manufacturer. Under no circumstances shall the pipe be stressed beyond its elastic limit. The winch line must be centered in the existing pipe to be burst with an adjustable boom.

C. The installed polyethylene pipe shall be allowed to relax and cool following installation in accordance with the manufacturer's recommended time, but not less than four (4) hours, prior to any reconnection of service lines, scaling of the annulus or backfilling of the insertion pit. Sufficient excess length of new pipe, but not less than four (4) inches, shall be allowed to protrude into the manhole to provide for further length reduction. End restraint of pipe ends shall be achieved by means of Central Plastics Electrofusion couplings. The Electrofusion couplings shall be slipped over pipe ends against manhole wall and fused in place. Installation of all electrofusion couplings shall be carried out in accordance with the manufacturers recommended procedures.

D. Following the relaxation period, the annular space may be sealed. Sealing shall be made with materials approved by the Engineer and/or his representative and shall extend a minimum of eight (8) inches into the manhole wall in such a manner as to form a smooth, uniform, watertight joint. The terminating pipe ends in manholes shall be connected by Central Plastics Electrofusion couplings to eliminate ground water infiltration. Electrofusion couplings shall be installed in accordance with the manufacturers recommended procedures.

3.05 Post-Installation CCTV Inspection

A. Following installation of new pipelines between manholes where bursting has occurred, CCTV inspection shall be carried out in accordance with the requirements of the Fulton County Manual for Internal Sewer Condition Assessment. The finished tape shall be continuous over the entire length of the sewer between two manholes and shall be completely free from visual defects.

B. The audio/video tape shall provide an audio description to what is being viewed; provide a continuous running footage indicator between manholes; and be prepared in the presence of the County's Inspector. Prior to Final Acceptance the County shall be provided with one copy of the TV inspection report and video cassette showing the entire length of gravity sewer being tested. The report shall contain the condition of pipe, type of pipe, depth, location of services, length, type joint, roundness and distance between manholes. Any pipe found to be cracked, leaking, misaligned, bellied or otherwise defective shall be removed and replaced.

C. Should any portion of the inspection tapes be of inadequate quality or coverage, as determined by the County, the Contractor will have the portion re-inspected and video taped at no additional expense to the County.

3.06 Pipe Joining

A. The polyethylene pipe shall be assembled and joined at the site using the butt-fusion method to provide a leak proof joint in strict accordance with the manufacturer's instructions and ASTM D 2657. Threaded or solvent-cement joints and connections are not permitted.

B. All equipment and procedures used shall be used in strict compliance with the manufacturer's instructions and recommendations. Fusing shall be accomplished by personnel certified as fusion technicians by a manufacturer of polyethylene pipe and/or fusing equipment.

C. The butt-fused joint shall be true alignment and shall have uniform roll-back beads resulting from the use of proper temperature and pressure. The joint shall be allowed adequate cooling time before removal of pressure. The fused joint shall be watertight and shall have tensile strength equal to that of the pipe.

D. All joints shall be subject to acceptance by the engineer and/or his representative prior to insertion. All defective joints shall be cut out and replaced at no cost to the County. Any section of the pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater in depth than ten percent (10%) of the wall thickness, shall not be used and must be removed from the site. However, a defective area of the pipe may be cut out and the joint fused in accordance with the procedures stated above.

E. Any section of the pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any other defect of manufacturing or handling as determined by the Engineer and/or his representative shall be discarded and not used.

F. Terminal sections of pipe that are joined within the insertion pit shall be connected with Central Plastics Electrofusion Couplings or connectors with tensile strength equivalent to that of the pipe being joined.

G. When transitioning from polyethylene pipe to ductile iron pipe, pipes shall be joined with a transition sleeve as recommended by the pipe manufacturer. Transition sleeves shall be approved by the construction manager.

3.07 Warranty

A written guarantee of 10 years submitted to the County for the specific project shall be provided by the Manufacturer against any breakdown of the polyethylene pipe material.

END OF SECTION

Section 02731 Sewers Rehabilitation

1.01 Scope

- A. This Section describes products for sewer and manhole rehabilitation and requirements for the installation and use of these items. Furnish all products and perform all labor necessary to fulfill the requirements of these Specifications. This Section covers the general requirements for the referenced specifications, manufacturer's and installer's qualifications, submittal and guaranty guidelines, materials, installation and testing procedures.
- B. General: Supply all products and perform all work in accordance with applicable American Society for Testing and Material (ASTM), American Water Works Association (AWWA), American National Standards Institute (ANSI), or other recognized standards. Latest revisions of all standards are applicable. Where discrepancies exist between this specification and referenced product/process standards, this specification shall govern

1.02 Qualifications - Contractor/Installer Experience Requirement

- A.. **The Installing Contractor** for the cured-in-place reconstruction of sewers must have a minimum of 5 years experience using the exact named product proposed and, have installed at least 300,000 linear feet of the exact named proposed product including at least 20,000 feet of 24-inch diameter (or larger) cured-in-place product. The installing Contractor must certify that the liner tube/resin composite system to be used is the exact system for which all submittals and certifications were made in the bid. No substitutions will be allowed, and misrepresentations or omissions may be grounds for contract termination with the Contractor waiving any and all claims against the Owner for work performed or costs incurred. **Documentation of experience shall be submitted in the Contractor's bid. Failure to provide this documentation may be grounds for disqualification.**
- B. **The Qualifying Superintendent** must have a minimum of five years experience with cured-in-place pipe products. In addition, the Qualifying Superintendent must have supervised jobs in which at least 20,000 feet of pipe has been reconstructed using the exact named product proposed including a minimum of 5,000 feet of 24-inch diameter (or larger) cured-in-place product. The superintendent for the job shall be on-site during all phases of the work involving any pre and post-installation video inspection, sewer cleaning or insertion and processing of the CIPP. **Documentation of experience shall be submitted in the Contractor's bid. Failure to provide this documentation may be grounds for disqualification.**
- C. **The cured-in-place pipe lining (CIPP) system** must have a minimum proven performance record of 1,000,000 linear feet installed of the exact name-brand product bid in the United States, with a minimum of 20,000 linear feet in diameters 24-inch or larger. In addition, a minimum of 10,000 linear feet of 48-inch diameter or larger, of the exact name brand product must have been installed in the United States. **Documentation of performance record shall be**

submitted with the Contractor's bid. Failure to provide this documentation may be grounds for disqualification.

- D. **The Contractor for Manhole Rehabilitation** shall be fully qualified, experienced and equipped to complete this work expeditiously and in a satisfactory manner. The qualified Contractor shall be an approved installer as certified and licensed by the manufacturer. The installing Contractor must certify that the proposed product/process to be used is the exact system for which any and all submittals and certifications were made. No substitutions will be allowed, and misrepresentations or omissions may be grounds for contract termination with the Contractor waiving any and all claims against the Owner for work performed or costs incurred.
- E. The Contractor and the proposed Qualifying Superintendent for the work under this Contract shall have successfully installed the allowed manhole lining product in a minimum of 500 manholes/structures as documented by verifiable Owner references. **Documentation of experience shall be submitted in the Contractor's bid. Failure to provide this documentation may be grounds for disqualification.** The Engineer/Owner shall approve both the Contractor and the Qualifying Superintendent to perform this work. The approved superintendent shall be on-site during the execution of all lining operations including prep work and vacuum testing. The lining installation and/or vacuum testing shall cease whenever the superintendent is not on-site

1.03 Submittals

- A. Complete product data and engineering data, including shop drawings, shall be submitted to the Engineer in accordance with the requirements of Section 01340 of these Specifications.
- B. Cured-In-Place-Pipe
1. The Contractor shall furnish three copies of the design calculations establishing the structural capabilities, chemical composition, thickness, curing temperature and period, assumptions, and other mechanical properties of the liner system proposed, signed and sealed by a professional engineer licensed in the state of Georgia.
 2. The Contractor shall furnish seven copies of the manufacturer's brochures giving a complete description of the product proposed, its physical and chemical composition, the same for the thermosetting resin or epoxy hardener, the recommended range of curing temperature, period of cure, cool-down procedures and method of installation.
- C. Manhole Rehabilitation: Submit manufacturer's product data including composition, physical properties, surface preparation, repair, application, curing, and field quality control.

1.04 Transportation and Handling

- A. Unloading: Furnish equipment and facilities for unloading, handling, distributing and storing materials. Make equipment available at all times for use in unloading. Do not drop or dump materials. Any materials dropped or dumped will be subject to rejection without additional justification.

- B. Handling: Handle materials carefully to prevent shock or damage. Handle pipe by rolling on skids, forklift, or front loader. Do not use material damaged in handling.

1.05 Storage and Protection

- A. Stored materials shall be kept safe from damage.

1.06 Quality Assurance

- A. Product manufacturers shall provide the Engineer with written certification that all products furnished comply with all applicable provisions of these Specifications.

1.07 Warranty and Repairs

- A. Each Manufacturer for manhole liners shall warrant the performance of the CIPP Liner materials for 5 years and Certified Installer shall provide 3-year labor warranty to repair or replace any failing conditions of the liner in the structure.
- B. The cured-in-place liner system shall be repairable at any time during the life of the structure, with the same type of liner system materials used in the original installation, including repair or lining of the upper chimney portion where grade adjustments have been made. Repair/lining materials shall be of the type that will bond to the original liner materials.

Part 2 Products

2.01 Cured-In-Place-Pipe

- A. The cured-in-place pipe material shall be fabricated from materials which, when cured, will be suitable for the environment intended, i.e., resistant to withstand exposure to sewage gases containing normal levels for domestic sewage of hydrogen sulfide, carbon monoxide, carbon dioxide, methane, traces of mercaptan, kerosene, saturation with moisture, dilute sulfuric acid, external exposure to soil bacteria, and any chemical attack which may be due to materials in the surrounding ground. The final product must not deteriorate, corrode, or lose structural strength in any manner that will preclude meeting the expected design life.
- B. The structural performance of the inverted cured-in-place pipe must be adequate to accommodate all internal and external loads (live and dead) over its service life. The CIPP liner shall be designed considering the host pipe is fully deteriorated, a prism loading, a soil loading of 120 pcf, a 2.0 factor of safety, a 2-percent ovality, a 5-percent maximum deflection, a 1,000 psi modulus of soil reaction, a 4,500 psi flexural strength, a 3,000 psi tensile strength, a lining enhancement factor (K) of 7 maximum, H-20 live loads where applicable, 50-percent long-term modulus reduction factor and a hydrostatic load beginning at the surface
- C. Polyester Resins

1. The resin used shall be high-grade corrosion resistant isophthalic polyester specifically designed for the CIPP being installed. Only premium, non-recycled resin shall be used. PET resins, or those containing fillers, additives or enhancement agents shall not be used. The resin must be manufactured under ISO 9002 certified procedures.
2. The resin vendor must be able to reference the corrosion scale with the resin itself having a heat deflection temperature greater than 212 degrees Fahrenheit

D. Urethane-modified Vinyl Ester Resins (if applicable)

1. The resin used shall be a high-grade, premium vinyl ester combining outstanding corrosion resistance and high-temperature performance with excellent laminating characteristics. The resin must be manufactured under ISO 9002 certified procedures.
2. The resin vendor must be able to reference the heat corrosion scale with the resin itself having a heat deflection temperature greater than 244 degrees Fahrenheit. Only premium, non-recycled resins will be accepted. PET resins or those containing enhancement additives and/or fillers will not be accepted.

E. Quality Assurance

In order that the Owner is assured that the specified resin class is used for the duration of the Contract, the following provisions are made part of this specification:

1. The Contractor shall designate a wet-out facility and shall provide wet-out liner tubes from this designated facility only. Multiple facilities to supply wet-out liner tubes for the duration of this contract may not be used without prior approval of the Owner/Engineer.
2. The Contractor shall place a sampling valve in-line at a point in the resin/catalyst mixing stage so that a sample of non-catalyzed resin may be taken. A second sampling valve shall be placed in-line at a point after the resin/catalyst mixing stage, but prior to catalyzed resin injection into the liner so that a resin sample may be taken. Both sampling valves shall be left in place for the duration of the Contract.
3. The Owner/Engineer shall have the right to inspect the designated wet-out facility and draw samples from one or both sampling valves without prior notice to the Contractor for the duration of the Contract.
4. To further assure usage of a specified resin class, the Owner reserves the right to subject resin samples to an infrared analysis (IR Scan). This standard analytical test involves shining a beam of light in the infrared frequency region through a thin sample of subject resin. The frequency of light is then varied across the infrared spectrum. Chemical functional groups present in the resin being analyzed will absorb infrared light at specific frequencies and with characteristic absorption intensities. A spectrum created from the measurement of light transmitted through the sample across the range of infrared frequencies shall be used to

determine the resin's chemical fingerprint. An overlaid IR spectrum of Reichhold PolyLite® 33420 shall be used as a baseline comparison for the purpose of a polyester test. The baseline comparison for vinyl ester shall be Reichhold Dion® 9800.

5. The Owner/Engineer may perform random Infrared Scans (IR Scans) and/or Composite Burn-offs to insure resin quality and consistency throughout the duration of the Contract and shall be responsible for the cost of IR testing.

F. Catalyst Systems

1. The exact mixture ratio of resin and catalyst shall also be submitted. The catalyst system shall be identified by product name. The resin/catalyst ratio shall be approved by the resin manufacturer in writing. The catalyst system shall be made up of a primary catalyst and a secondary catalyst. The primary catalyst shall be Akzo Perkadox 16 or approved equal and shall be added at a maximum of 1% of the resin volume by weight unless otherwise approved by the Engineer. The secondary catalyst shall be Akzo Trigonox or approved equal and shall be added at a maximum of 0.05% of the resin volume by weight unless otherwise approved by the Engineer.
2. "Quick-Cure" or accelerated resin systems including those formulated by substantially increasing the amount of catalysts from that specified above, will not be allowed. Resins, catalysts and resin/catalyst mix ratios shall not be changed or altered during this Contract unless specifically approved by the Owner/Engineer in writing.
3. Cure schedules for the CIPP shall be submitted to the Engineer for review. The proposed curing schedules/process shall be approved by the resin manufacturer in writing. Cure schedules shall include specific information on "step curing" procedures, "cooking times", duration and "cool down" procedures – all to be approved by the resin manufacturer in writing.
4. The resin shall be shipped directly from the resin manufacturer's facility to the CIPP wet-out facility. The resin shall not be sent to any intermediate mixing facility. Copies of the shipping documents from the resin manufacturer shall be submitted to the Engineer indicating dates of shipment, originating and receiving locations.
5. The Contractor shall submit a Certificate of Authenticity from the resin manufacturer for each shipment to the wet-out facility to include the date of manufacture and Heat Distortion Temperature. This information shall be submitted before the manufacture or installation of any CIPP.

G. Liner Tubes

1. The tube shall consist of one or more layers of absorbent non-woven felt fabric and meet the requirements of ASTM F1216. In the event of a discrepancy between the referenced ASTM requirement and this specification, this specification will govern.

2. The acceptable liner tube shall be constructed under ISO 9002 certified procedures. Proper certification shall be provided prior to the manufacture or installation of any CIPP.
3. The tube shall be constructed to withstand installation pressures, have sufficient strength to bridge missing pipe, and stretch to fit irregular shaped pipe sections.
4. The wet-out tube shall have a uniform thickness that when compressed at installation pressures shall meet or exceed design "finished and installed" thickness.
5. The tube shall be manufactured to a size that when installed shall tightly fit the internal circumference and length of the original pipe. In the event that under-sized pipe is present, liner tube shall be manufactured so that overlap folds or wrinkles do not occur. Allowances shall be made for circumferential stretching during inversion.
6. The outside layer of the tube, before installation, shall have an impermeable polyurethane or polyethylene plastic coating. This coating shall be an impermeable, flexible membrane that shall contain the resin and facilitate monitoring of resin saturation during resin impregnation. This coating shall form the inner layer of the finished pipe and is required for enhancement of corrosion resistance, flow and abrasion properties.
7. The tube shall be homogeneous across the entire wall thickness containing no intermediate or encapsulated layers. No material may be included in the tube that may cause de-lamination in the cured liner, and no dry or unsaturated areas or layer shall be evident.
8. The wall color of the interior liner surface after installation shall be a light-reflective color so that a clear, detailed inspection with closed-circuit television equipment may be conducted.
9. The outside of the tube shall be marked for distance at regular intervals not to exceed 10 feet. Such markings shall include the Manufacturers name or identifying symbol.
10. The minimum length shall be that deemed necessary by the Owner/Engineer to effectively span the distance between manhole sections of the segment to be lined unless otherwise specified. The line lengths shall be verified in the field before impregnation of the tube with resin.

H. CIPP Design - Liner Tube Thickness

1. Liner Thickness: The Contractor shall submit liner thickness calculations to the Owner/Engineer for review. The CIPP shall be designed in accordance with the applicable provisions of F1216 and D2412 for "fully deteriorated gravity pipe conditions" and shall meet the following design conditions:
 - a. AASHTO H-20 Live Load with two trucks passing for CIPP in streets (16,000 lbs.)

- b. A soil modulus of elasticity of 1000 psi, soil weight of 120 pounds per cubic foot and a coefficient of friction of $K_u=0.130r$.
 - c. Short-term flexural modulus of 250,000 psi and long-term modulus of 125,000 psi. Flexural strength of 4,500 psi.
 - d. Safety factor of 2.0 shall be used.
 - e. Groundwater elevation at the ground surface.
 - f. Pipe ovality of 2%.
 - g. Poisson ratio of 0.3.
 - h. Enhancement factor (K) of 7.
 - i. Service temperature range shall be 40 to 140 degrees F.
 - j. Maximum long-term deflection shall be 5%.
2. The CIPP shall also conform to the minimum requirements demonstrated in the following table:

Physical Property	ASTM Standard F 1216, Latest Revision	Minimum Value
Flexural Stress	ASTM D-790	4,500 psi
Flexural Modulus of Elasticity	ASTM D-790	250,000 psi

3. Minimum Acceptable Pipe Thickness ("**Finished and Installed**")
- a. The minimum "finished and installed" cured liner thickness shall be as follows, regardless of what the calculations indicate as the required minimum thickness:

Pipe Diameter (Inches)	Depth to Invert (Feet)	"Finished & Installed" Thickness (mm)
TBD	TBD	TBD

- b. The above table is in regards to minimum liner thicknesses only. It is the Contractor's responsibility to determine the site specific external loads on the liner and increase its thickness as required. The Contractor shall submit his proposed plan for ensuring that the finished and installed CIPP meets the above minimum thickness requirements. The plan shall include detailed inversion procedures to reduce stretching and resin loss.
- c. The contractor shall submit his price proposal based on the appropriate length, size, and existing pipe parameters designated on the Bid Form. The deterioration of sewers is an on-going process. Should pre-construction inspections reveal the sewers to be in substantially different conditions than those in the design considerations, the contractor shall request such changes in reconstruction liner thickness, supporting such requests with design data. The deviation, if approved, shall be reflected by the appropriate addition or reduction in the unit cost for that size as agreed to by the Owner/Engineer.
- d. Any liner that does not meet the specified strength and/or thickness requirements, regardless of the amount below the specified requirements, shall be corrected by the Contractor in a manner approved by the Owner/Engineer at no additional cost to

the Owner. The Owner/Engineer's decision on how to correct deficient CIPP installations shall be final.

- e. Any liner that does not meet the specified strength and/or thickness requirements, regardless of the amount below the specified requirements, shall be corrected by the Contractor in a manner approved by the Engineer at no additional cost to the Owner. The Engineer's decision on how to correct deficient CIPP installations shall be final. Options for correcting deficient liners that will be considered by the Engineer include removing the liner and re-lining the sewer, excavating and replacing the sewer from manhole to manhole, or providing the Owner with a substantial credit. The primary option that will be considered will be to re-line the sewer. Credits will only be authorized for CIPP that does not meet required thickness. If a credit is acceptable to the Owner and Engineer, the credit shall be calculated by multiplying the bid price by the percent that the liner thickness is below the required installed thickness as follows:

Credit =
(1 – Installed CIPP thickness/required CIPP thickness) x bid price

The Contractor shall not assume a credit will be acceptable to the Engineer/Owner in any case.

4. The finished CIPP will provide a uniform smooth, interior wall surface and will have at least 100% of the flow capacity of the original pipe before rehabilitation. In lieu of measurements, calculated capacities may be derived using a Manning "n" coefficient of 0.013 for the original pipe material and a Manning "n" coefficient of 0.010 for a joint-less smooth-wall cured-in-place pipe.
 - I. Resin Impregnation of the CIPP Tube (Wet-Out)
 1. The contractor shall designate a location where the tube shall be impregnated or "wet out" with resin, using distribution rollers and a vacuum impregnation system to thoroughly saturate the tube's felt fiber prior to installation in the field. The impregnated tube shall be free of pinholes, resin voids and other defects. If the cured-in-place pipe is impregnated at the manufacturing plant, it shall be delivered to the job site in a refrigerated truck, and remain refrigerated prior to installation to prevent premature curing. The flexible tube shall be vacuum impregnated with resin under controlled conditions or by such other means provided such means can assure thorough resin impregnation to the full satisfaction of the Owner/Engineer. The volume of resin used shall be sufficient to fill all voids in the tube material at normal or design thickness and diameter. The volume of resin shall be adjusted by adding seven to ten percent excess resin for the change in resin volume due to polymerization and allow for any migration of resin into the cracks and joints in the original pipe.
 - J. Inversion of CIPP
 1. The impregnated tube shall be inverted through an existing manhole or other approved access point utilizing a hydrostatic water column or

pressurized air until it has fully traversed the designated line length and the inversion face breaches the destination manhole or termination point. The fluid column or air pressure shall have been adjusted and maintained to be sufficient to cause the impregnated tube to hold tight against the existing pipe wall, produce dimples at side connections, and flared ends at the manholes. Lubricant during inversion shall be used as necessary in accordance with the CIPP manufacturer's recommendations. Thermocouples shall be placed at the top and bottom interface of both ends of the liner for monitoring temperature during the cure cycle. Care should be taken during tube installation not to over-stress the fabric fiber.

2. When using pressurized air, particular attention should be given to the maintenance of the minimum required "finished and installed" thickness of the CIPP. Before the inversion begins, the tube manufacturer shall provide the minimum air pressure required to hold the tube tight against the host pipe and the maximum allowable pressure so as not to damage the tube. Once the inversion has started, pressure shall be maintained between the minimum and maximum pressures until the inversion has been accomplished.

K. Curing - Using Circulated Heated Water

1. A suitable heat source and water recirculation equipment is required to circulate heated water throughout the pipe. The equipment shall be capable of delivering hot water throughout the inverted tube to uniformly raise the temperature required to affect a cure of the resin.
 - a. Initial cure will occur during temperature heat-up and is completed when exposed portions of the new pipe appear to be hard and sound and the thermocouples indicate that the temperature is of a magnitude to realize an exotherm or cure in the resin. After initial cure is reached, the temperature should be raised to the post-cure temperature recommended by the resin manufacturer. Post-Cure temperature should be held for a period as recommended by the resin manufacturer, during which time the recirculation of the water and cycling of the heat source to maintain the temperature continues.
 - b. Prior to any inversion, the Contractor shall provide a Post-Cure Hold Time and Temperature Table. This table shall indicate the minimum time and temperature the inverted tube will be held at in order to achieve desired physical properties. The resin manufacturer shall certify both the time and temperatures presented in the table.
 - c. Curing must take into account the existing pipe material, the resin system, and the ground conditions (temperature, moisture level, and thermal conductivity of the soil).

L. Curing - Using Controlled Steam

1. Suitable steam-generating equipment is required to distribute steam throughout the pipe. The equipment shall be capable of delivering steam

throughout the inverted tube to uniformly raise the temperature required to affect a cure of the resin.

- a. Initial cure will occur during temperature heat-up and is completed when exposed portions of the new pipe appear to be hard and sound and the thermocouples indicate that the temperature is of a magnitude to realize an exotherm or cure in the resin. After initial cure is reached, the temperature should be raised to the post-cure temperature recommended by the resin manufacturer. Post-Cure temperature should be held for a period as recommended by the resin manufacturer, during which time the distribution and control of steam to maintain the temperature continues.
- b. Prior to any inversion, the Contractor shall provide a Post-Cure Hold Time and Temperature Table. This table shall indicate the minimum time and temperature the inverted tube will be held at in order to achieve desired physical properties. The resin manufacturer shall certify both the time and temperatures on the table.
- c. The Time and Temperature Table submitted when using steam curing shall be identical to time and temperature hold times when curing with heated, circulated water.
- d. Curing must take into account the existing pipe material, the resin system, and the ground conditions (temperature, moisture level, and thermal conductivity of the soil).

M. Cool-Down

1. Cool-down of the cured pipe liner shall be in accordance with the manufacturer's recommendations. Care should be taken during the cool-down process so as to minimize shrinkage of the CIPP.

N. Lateral Service Reinstatement

1. After the CIPP has been cured, the existing service connections and laterals shall be reinstated. In general, reinstatement of service connections and laterals shall be accomplished internally, without surface excavation, using a remote control cutting device equipped with a television monitor. Reopened services shall be wire brushed to the satisfaction of the Owner/Engineer. In some cases, remote reinstatement may not be possible. In these instances, reinstatement by conventional methods in accordance with the standard Specifications is acceptable. All connections must be reinstated by at least 95-percent of the original opening.

O. Other Applicable Specifications of Publications: The latest revisions of the publications listed below form a part of these Specifications:

- | | |
|---------------|--|
| ASTM F1216-03 | Standard practice for rehabilitation of existing pipelines and conduits by the inversion and curing of a resin-impregnated tube. |
| ASTM D638 | Test method for tensile strength properties. |

ASTM D790	Flexural strength.
ASTM D790	Modulus of elasticity.
ASTM D732	Shear strength.
ASTM D695	Compressive strength.

2.02 Manhole Rehabilitation - General

- A. The cured surfacing thickness shall be smooth, even (without ridges or bumps) and continuous with proper sealing connections to any non-rehabilitated areas.
- B. Chemical sealants or grouts used to seal active manhole leaks, patch holes or cracks, fill voids and to otherwise prepare the manhole surface for lining shall be suitable for sewer system service and chemically resistant to any chemicals or vapors normally associated with domestic sewerage installations.
- C. All invert channels shall be coated with grout or cementitious mortar to build up the invert to the invert elevations of new liner pipes (if applicable and as directed by the Engineer); to fill all cracks, voids, holes, etc.; and to form a smooth flow channel. The entire channel shall be coated with the channel coating being a minimum $\frac{1}{4}$ - inch thick.
- D. The Contractor shall submit complete shop drawings of the manhole lining system(s) to demonstrate compliance with these specifications, materials and detailed installation procedures. Testing procedures and quality control procedures shall also be submitted. Certifications that the lining system was manufactured in accordance with these specifications and the applicable ASTM standards shall be submitted with each material shipment.
- E. The cementitious lining system shall be a pumpable Portland-based cement or fused calcium aluminate cement. The lining shall be installed via low-pressure application only. The materials shall be suitable for all specified design conditions.
- F. The cementitious lining shall be installed on manhole benches and walls unless otherwise directed by the Engineer. All cementitious lining shall be troweled smooth after spray application. The cured cementitious lining shall have a minimum total thickness of 1-inch.
- G. The materials used in the cementitious lining systems shall be mixed on-site according to the manufacturer's recommendations. Water shall only be added to the materials during the mixing process and prior to material pumping or spray application. No water shall be added at the nozzle.
- H. The cementitious liner when cured shall have the following minimum characteristics at 28 days as measured by the applicable ASTM standards referenced in this Specification:
 - 1. Minimum compressive strength of 6,000 psi
 - 2. Minimum bond strength of 130 psi
 - 3. Shrinkage of less than 0.05%

- I. The cured cementitious lining shall be continuously bonded to all brick, mortar, concrete, chemical sealant, grout, pipe and other surfaces inside the manhole. The Contractor shall provide bond strength data on the cured cementitious lining based on ASTM test methods referenced in this Specification.
- J. The monolithic cementitious lining shall completely cover the interior of the existing manhole including the benches unless otherwise directed by the Engineer. The lining shall effectively seal the interior surfaces of the manhole and prevent any penetration or leakage of ground water infiltration.
- K. Cementitious linings shall be compatible with existing thermal conditions in the manhole. Manhole surface temperatures will range from 20 to 100 degrees F. The Contractor shall provide test data on shrinkage of the cured cementitious lining based on ASTM test methods referenced in this Specification.

2.03 Spray on Cementitious Manhole Lining

A. Product Requirements (Level A):

The cementitious manhole lining system for the interior of manholes shall be a monolithic system suitable for use as a trowel or sprayed-on resurfacing in sewer manholes. The final product must not deteriorate, corrode, or lose structural strength in any manner that will preclude meeting the expected design life. The cementitious lining system shall be one of the following products or approved equal:

1. Strong Seal MS-2A, MS-2C or High performance Mix by Strong Seal Systems
2. QM-1s Restore or Alumaliner by Quadex
3. Permacast MS-10,000 or CR-5000 by APM, Inc.
4. Sewpercoat PG by LaFarge Calcium Aluminates

B. Product Requirements (Level B):

1. Where hydrogen sulfide resistance is required, the cementitious lining system shall be one of the following products or approved equal:
 - a. High performance Mix by Strong Seal Systems
 - b. Alumaliner by Quadex
 - c. Permacast MS-10,000 or CR-5000 with Conshield by APM, Inc.
 - d. Sewpercoat PG by LaFarge Calcium Aluminates
2. In lieu of installing one of the Level B hydrogen sulfide resistant cementitious mortar products in a minimum 1-inch thickness, the Contractor may install one of the specified Level B products in a minimum $\frac{3}{4}$ " thickness followed by a minimum 160 mil topcoat of epoxy to provide the required corrosion resistance. Acceptable topcoat applications shall be one of the following products or approved equal:
 - a. Raven 405 by Raven Lining Systems
 - b. Cor-Gard by APM, Inc.

Part 3 Execution

3.01 Existing Utilities and Obstructions

- A. The Contractor shall call the Utilities Protection Center (UPC) (325 5000 or 1 800 282 7411) as required by Georgia law (O.C.G.A. §§ 25 9 1 through 25 9 13) and all utilities, agencies or departments that own and/or operate utilities in the vicinity of the construction work site, at least 72 hours (three business days) prior to construction, to verify the location of the existing utilities.
- B. Existing Utility Location: The following steps shall be exercised to avoid interruption of existing utility service.
 - 1. Provide the required notice to the utility owners and allow them to locate their facilities according to Georgia law. Field utility locations are valid for only ten days after original notice. The Contractor shall ensure, at the time of any excavation that a valid utility location exists at the point of excavation.
 - 2. Avoid utility damage and interruption by protecting it with means or methods recommended by the utility owner.
 - 3. Maintain a log identifying when phone calls were made, who was called, area for which utility relocation was requested and work order number issued, if any. The Contractor shall provide the Engineer an updated copy of the log bi weekly, or more frequently if required.

3.02 Construction Along Highways, Streets and Roadways

- A. Traffic Control
 - 1. The Contractor shall: provide, erect and maintain all necessary barricades; suitable and sufficient lights and other traffic control devices; provide qualified flagmen where necessary to direct traffic; take all necessary precautions for the protection of the work and the safety of the public.
 - 2. Construction traffic control devices and their installation shall be in accordance with the current U.S. DOT Manual On Uniform Traffic Control Devices for Streets and Highways Section 104.05 and 107.07, and the Georgia Department of Transportation Standard Specification Section 107.09.
 - 3. Placement and removal of construction traffic control devices shall be coordinated with the appropriate agencies a minimum of 48 hours in advance of the activity.
 - 4. Placement of construction traffic control devices shall be scheduled ahead of associated construction activities. Construction time in street right of way shall be conducted to minimize the length of time traffic is disrupted. Construction traffic control devices shall be removed immediately following their useful purpose. Traffic control devices used

intermittently, such as "Flagmen Ahead", shall be removed and replaced when needed.

5. Existing traffic control devices within the construction work zone shall be protected from damage. Traffic control devices requiring temporary relocation shall be located as near as possible to their original vertical and horizontal locations. Original locations shall be measured from reference points and recorded in a log prior to relocation. Temporary locations shall provide the same visibility to affected traffic as the original location. Relocated traffic control devices shall be reinstalled in their original locations as soon as practical following construction.
 6. Construction traffic control devices shall be maintained in good repair, and shall be clean and visible to affected traffic for daytime and nighttime operation. Traffic control devices affected by the construction work zone shall be inspected daily.
 7. Construction warning signs shall be black legend on an orange background. Regulatory signs shall be black legend on a white background. Construction sign panels shall meet the minimum reflective requirements of the State Department of Transportation. Sign panels shall be of durable materials capable of maintaining their color, reflective character and legibility during the period of construction.
 8. Channelization devices shall be positioned preceding an obstruction at a taper length as required by the current Manual On Uniform Traffic Control Devices for Streets and Highways, as appropriate for the speed limit at that location. Channelization devices shall be patrolled to insure that they are maintained in the proper position throughout their period of use.
- C. Construction Operations
1. Perform all work along highways, streets and roadways to minimize interference with traffic.
 2. Stripping: Where the work is along road right of way, strip and stockpile all sod, topsoil and other material suitable for right of way restoration.
 3. Shaping: Reshape damaged slopes, side ditches, and ditch lines immediately after completing backfilling operations. Replace topsoil, sod and any other materials removed from shoulders.
- D. Excavated Materials: Do not place excavated material along highways, streets and roadways in a manner which obstructs traffic. Sweep all scattered excavated material off the pavement in a timely manner.
- E. Drainage Structures: Keep all side ditches, culverts, cross drains, and other drainage structures clear of excavated material. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.
- F. Landscaping Features: Landscaping features shall include, but are not necessarily limited to: fences; property corners; cultivated trees and shrubbery; manmade improvements; subdivision and other signs within the right of way and easement. The Contractor shall take extreme care in moving landscape features and promptly re establishing these features.

- G. Maintaining Highways, Streets, Roadways and Driveways
1. Maintain streets, highways, roadways and driveways in suitable condition for movement of traffic until completion and final acceptance of the work.
 2. During the time period between pavement removal and completing permanent pavement replacement, maintain highways, streets and roadways by the use of steel running plates. The edges of running plates shall have asphalt placed around their periphery to minimize vehicular impact. The backfill above the pipe shall be compacted, as specified elsewhere up to the existing pavement surface to provide support for the steel running plates. Steel running plates shall be designed to support H-20 traffic loadings.
 3. Furnish a road grader or front end loader for maintaining highways, streets, and roadways. Make the grader or front end loader available at all times.
 4. Immediately repair all driveways that are cut or damaged. Maintain them in a suitable condition for use until completion and final acceptance of the work.

3.03 By-Pass Pumping

- A. The installation methodology contemplated requires the temporary blocking and back-ups of sewers and sewage. Contractor shall be responsible to limit the extent and duration of such blockages and back-ups so that overflows and spillage onto public or private property and into storm sewers, waterways, and streets does not occur. In the event that such spillage or overflows do occur during the course of or as a result of the Work, the Contractor performing the Work shall immediately eliminate the spillage or overflow and, as necessary, remove the blockage and eliminate the back-up. On elimination of the spillage or overflow, the Contractor is to clean up and disinfect the area. Work to stop or contain such events is to be deemed EMERGENCY in nature and sufficient justification for total mobilization of resources, the use of overtime or double time, and any other reasonable measures to assure correction of the problem without delay. Damages arising from blockages, back-ups, spillage, or overflows of sewage during the course of the Work or because of the Work shall be the sole responsibility of the Contractor.
- B. Sewage flow shall be pumped around segments during the installation and testing of cured-in-place pipe, the televising of sewers and lateral service reinstatement.
- C. Pumping equipment shall have the capacity to convey 100% of peak flows around the construction area. The flow shall be intercepted at the upstream end of the construction area and shall be pumped through temporary piping of adequate size. The flow shall be discharged into a manhole on the downstream side of the construction area, thus by-passing the sewer segment(s) under construction. The Contractor shall be required to contact all residential and commercial customers whose service lines connect to the sewer main being bypassed and inform them that they will be temporarily out of service. The Contractor shall also advise those customers against water usage until the mainline is back in service. After completing the necessary work on the main line

to allow its reuse, the Contractor shall advise those customers that the sewer main is back in service. The Contractor shall maintain a high degree of professionalism, both in workmanship and appearance, at all times. Should a condition arise that the Contractor cannot restore service within 12 hours of service interruption; the Contractor shall make provisions for pumping all flows within the service interruption area at no cost to the Owner.

- D. Open channels or trenches shall not be used to convey flow.
- E. A standby pump of the same capacity shall be required on site.
- F. The Contractor is responsible for paying all fines imposed for overflows or spills during construction.

3.04 Cured-In-Place-Pipe Rehabilitation

- A. All reconstruction of existing gravity sewer mains using an approved CIPP Product and Installer shall be performed in strict accordance with this Specification and the latest revision of ASTM F1216. Where discrepancies exist, or any latitude is either inferred or interpreted between this specification and ASTM product and process standards, this Specification shall govern.
- B. Pull-In and Inflate methods of CIPP installations, (reference ASTM F1743), will not be acceptable.
- C. The Contractor shall carry out his operations in strict accordance with all applicable OSHA standards. Particular attention is drawn to those safety requirements involving work on an elevated platform and entry into a confined space.
- D. The Owner will be responsible for locating and accessing all manholes and provide access to water hydrants for cleaning, inversion and other work items requiring water.
- E. All surfaces, which have been damaged by the Contractor's operations, shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of the Contractor's operations. Suitable materials and methods, acceptable to the Owner/Engineer, shall be used for such restoration. The restoration of existing property or structures shall be done as promptly as practicable and shall not be left until the end of the construction period. The cost for correcting damages resulting from the Contractor's actions shall be the responsibility of the Contractor.
- F. The tube shall be fabricated to a size that, when installed, will neatly fit the internal circumference of the conduit(s) designated for CIPP. Allowance shall be made for the circumferential stretching during insertion of the tube. After curing of the resin is completed, the hardened CIPP will extend from manhole to manhole of the section designated providing a structurally sound, corrosion-resistant, watertight conduit that excludes exfiltration and infiltration, is tight-fitting within the existing pipe, and is free of voids or annular spaces between the CIPP and the existing pipe walls. K-Factor for tightness shall equal 7.0 or greater. All terminations into manhole walls shall be watertight at the time of final inspection. No annular space shall be visible between the CIPP and manhole wall. In the event that an annular space is present, it shall be completely filled with epoxy or other suitable material to the satisfaction of the Owner/Engineer.

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- G. The Contractor shall be responsible for determining the minimum length to effectively span the distance from the manhole to manhole and shall verify the length of the fabric tube in the field before the tube is either cut to length or wet-out with resin. The tube may run through one or more manholes with the approval of the Owner/Engineer.
- H. All active laterals, taps, or side connections will be reinstated from inside the rehabilitated pipe where possible. In smaller diameter pipe in which man-entry is not possible, side connections must be reinstated internally by suitable, TV-monitored, robotic cutting equipment. Cross-sections of the opening of the side connections must be reinstated by at least 95-percent of the original opening. Reinstated lateral service openings shall be brushed smooth to the satisfaction of the Owner/Engineer. Main-to-lateral connections shall be as watertight as possible to the satisfaction of the Owner/Engineer and verified as such via post CCTV inspection. The cost for correcting deficiencies discovered shall be the responsibility of the Contractor.
- I. Preliminary Preparation:
1. Cleaning of Sewers
 - a. Sewers shall be cleaned of all debris, roots and other materials that would inhibit proper inversion of CIPP.
 - b. Utilizing high-pressure jet cleaning equipment, several passes are completed to assure that all debris is removed from the pipe to the satisfaction of the Owner/Engineer.
 - c. Heavy cleaning of sewers shall be performed if roots are present which require the use of mechanical brushes or dragging devices or, if in the judgment of the Owner/Engineer, the pipe is more than 25% full of debris, the pipe shall be cleaned to the satisfaction of the Owner/Engineer.
 2. Debris Disposal

All debris cleaned from the pipe shall be removed and disposed of at a dumpsite designated by the Owner at no additional cost to the Contractor. Debris shall not be allowed to wash into any other pipe segment either upstream or downstream from the pipe segment being cleaned.
 3. Provision and Usage of Water

The Owner shall provide all water required to perform this Work. The Owner shall provide a fire hydrant meter at no cost to the Contractor beyond the normal security deposit for use on the Project. Contractor shall coordinate connection and usage limits and withdrawal locations with the Owner prior to construction.
 4. Pre-Installation Video Inspection
 - a. Prior to installation of the CIPP, but not more than 48-hours prior to such installation, the section of sewer designated for CIPP is

to be televised its full length using a remote television camera specifically designed for that purpose.

- b. Inspection of the sewer pipe shall be performed by the Contractor's experienced personnel trained in location breaks and obstacles by CCTV inspection. Utilizing a color video inspection system with data recording capabilities, the entire pipe section to be lined shall be recorded in a Digital Format and two (2) copies produced. The interior of the pipe shall be carefully inspected to determine the location of any conditions, which may prevent the proper installation of the CIPP, and it shall be noted so that these conditions can be corrected. A DVD/CD-ROM and suitable log shall be submitted to the Owner.
 - c. Pre and post-installation videos and logs shall be submitted during the course of the Work. The television camera used for this purpose shall be operative in one hundred percent moisture conditions. Lighting for the camera shall be sufficient to yield a clear picture of the entire periphery of the pipe. The camera, television monitor, and other components of the video system shall be capable of producing a five hundred line resolution picture. The camera's rate of travel shall not exceed 20 feet per minute. At each service, the camera shall come to a complete stop and the service shall be panned so that the entire cross-sectional area of the service is inspected. The footage meter count shall be clearly visible. Logs shall include date, line size, length, manhole numbers and project number, direction of camera travel, direction of flow, and any observed defects or comments. For each service the log should include the distance from manhole, its location (e.g. 9:00 or 2:00 o'clock), street address or parcel, and distance from mainline to cleanout. Videos between manhole segments shall be continuous; no breaks or "blink-outs" in the video shall be observed. The videos shall be in CD-ROM or DVD format.
 - d. Sewer service connections shall also be TV inspected from within the sewer main, identifying all service connection locations and conditions. Conditions of service connections shall be noted in the log.
 - e. The full cross-sectional area of the pipe shall be visible during video inspection except where misalignment of the sewer may have resulted in standing water in bellies or sags.
 - f. If for any reason the camera becomes disabled inside the sewer and cannot further proceed, the Contractor will be responsible for retrieving the camera at no additional cost to the Owner.
5. Identification and Pre-measurement of Lateral Connections

A 360-degree Pan-and-Tilt view camera shall be used to inspect the pipe. At each connection the operator will stop and turn the camera lens toward the lateral thereby inspecting the first 8 to 12 inches of the lateral connection. The Contractor shall be responsible for determining if connection is active or inactive. For each existing service connection

determined by the Contractor to be active, the Contractor shall determine the condition of the service connection to the main, make his recommendation for lateral connection repair, and record both items in his log.

6. Traffic Control

The Contractor shall be responsible for traffic control during the course of each phase of the Work. Prior to beginning Work, Contractor shall submit a traffic control plan for each section of Work for the review and approval. It is the intent that this Work is to be accomplished with as little disturbance to traffic, private property, and the public as is reasonably possible, consistent with timely completion thereof. The traffic control plan shall reflect such requirements where applicable. Signs, signals, and detours shall conform to the Georgia Department of Highways & Public Transportation requirements for streets and highways, latest edition. The Contractor shall have and maintain on site a sufficient supply of traffic cones and other traffic signaling devices, including trained and properly equipped flagmen, to safely control all traffic through the work zone(s). Road closures and / or detours will require advance scheduling and prior approval by the Owner/Engineer.

3.05 Manhole Rehabilitation - Installation

A. Surface Preparation (All Levels)

1. The Contractor shall clean each sewer manhole to be restored and shall dispose of any debris or resulting material in a manner and place suitable to the Owner. Cleaning shall be performed using a high-pressure jet wash at a minimum of 3,500 psi water pressure to remove all dust, biological growths, grease, oils or any other surface contaminants or coatings.
2. The Contractor shall immediately notify the Engineer of any coatings that cannot be removed and, upon the approval of the Engineer, may coarse sand the area(s) to rough up the surface sufficient to obtain and insure adequate bonding of the liner. Roots shall be removed by manually cutting them from inside the manhole.
3. The Contractor shall conduct a visual inspection of each manhole after it is cleaned. All active hydrostatic leaks shall be plugged or sealed with an appropriate grout compatible with the lining. Injection grouting may be required to seal active leaks including existing leaks in invert channels and benches. All loose mortar and rubble of existing benches, walls and inverts shall be removed.
4. The Contractor shall prepare the manhole as necessary by reshaping and repairing benches, inverts and walls where required including smoothing out irregular shaped corbel and chimney sections prior to any spray application. All interior surfaces shall be prepared as recommended by the lining system manufacturer. Minimum requirements of the Specification are as follows:
 - a. All cracks and voids must be repaired and filled with suitable non-shrinking cements, sealants or grouts, including all voids

between existing sewer pipes and manhole walls. All patch repairs shall be smooth and even with the manhole wall.

- b. All voids around existing manhole rungs, steps and anchors shall be filled.
 - c. All surfaces shall be suitably prepared for the required bonding of the liner as recommended by the manufacturer and acceptable to the Engineer.
 5. Prior to lining, the Engineer shall inspect and approve the surface preparation work. The Contractor shall notify the Engineer when the manholes are ready for inspection. The manhole lining shall be completed immediately after the Engineer's inspection or the manhole may need to be re-cleaned prior to spraying to remove accumulated debris on walls and benches.
- B. Installation of Cementitious Lining (Levels A & B)
1. The Contractor shall notify all property owners who discharge sewage directly into the manhole being rehabilitated at least 48 hours in advance, giving the date, starting and estimated completion time for the work being conducted and any anticipated impact to the property owner.
 2. The Contractor shall bypass pump sewage flows around the manhole being rehabilitated while the work is being performed. A detailed bypass plan shall be submitted to the Engineer for approval before any work shall take place.
 3. The Contractor shall furnish and install the cementitious lining in each manhole as designated on the Plans or as otherwise directed by the Engineer. The work shall be done in compliance with the manufacturer's recommendations, applicable ASTM standards and this Specification.
 4. Manhole walls and benches shall be monolithically coated to the required thickness by spray-on methods in a single pass or application. Sprayed linings shall be troweled smooth after application.
 5. The invert channel (where applicable and as directed by the Engineer) shall be coated with an appropriate quick-set grout in accordance with the manufacturer's instructions.
 6. A complete watertight seal shall be provided at the pipe and manhole wall connections. The Contractor shall submit details of how watertight connections shall be made to the Engineer for approval prior to performing any work.
 7. Manhole lining shall not be installed until all required mainline sewer rehabilitation and/or other manhole work is completed.

3.06 Inspection and Testing

A. Field Acceptance

1. Field acceptance of manhole lining shall be based on the Engineer's field inspection and evaluation of the appropriate installation and curing test data. The lining shall provide a continuous monolithic surfacing with uniform thickness throughout the manhole interior. If the thickness is not uniform or is less than specified, it shall be repaired or replaced at no additional cost to the Owner.
2. If the Engineer has to enter the manhole to inspect the work, the Contractor shall provide forced air ventilation, gas monitors, harnesses, lights, confined space entry, etc. for the Engineer or Owner to enter the manhole and perform the inspection in strict and complete accordance with OSHA requirements at no additional cost to the Owner.

B. Preparation of Test Samples

1. Samples shall be taken of the installed liner each day that the lining is installed in the following manner:

Number of Manholes Lined in One Day	Number of Samples Taken
1 – 5	1
6 – 10	2
11 – 15	3
16 or more	4

2. Samples shall be taken at equally spaced intervals throughout the workday. The frequency of tests may be increased by the Engineer and performed by the Contractor at no additional cost to the Owner when the required tests indicate that the installed lining does not meet the Specification.

C. Strength & Bonding Testing Procedures

Samples shall be cube samples. A minimum of six (6) cubes shall be taken for each sample testing. The samples shall be tested in accordance with the applicable ASTM standards to verify that the installed liner meets the compressive strength requirements specified herein and the lining manufacturer's published product data. Tests shall include 7-day and 28-day strength tests (3 cubes for each time period per sample). Shrinkage and bond strength tests shall be performed on each batch or lot of material shipped to the Contractor. Testing shall be performed by an independent laboratory with all associated costs paid by the Contractor. The test results shall be submitted to the Engineer immediately when available and no later than 30 days after lining installation.

D. Vacuum Testing

1. All manholes shall be vacuum tested when ALL manhole rehabilitation is completed. Manholes shall not be tested until at least 7 days after installation of lining.
2. Vacuum testing shall be performed in accordance with ASTM C 1244.

3. The Engineer or Owner shall be present for all testing. The Contractor shall notify the Engineer 48 hours prior to testing.
4. The Contractor shall submit test reports of the testing which include: the project name, manhole tested, testing data (vacuum pressure, duration of test, etc.) and whether the manhole passed or failed the test. Test reports must be submitted citing the reason for failure noted on the report.
5. Any manhole failing the test shall be repaired and retested immediately by the Contractor at no additional cost to the Owner.

E. Finished Lining Systems

1. There shall be no groundwater infiltration or other leakage (active or previously active) through the manhole walls, benches, inverts or pipe connections at the manhole after it has been lined.
2. If leakage is detected, it shall be eliminated with an appropriate cement mortar, grout or sealant as recommended by the manufacturer and approved by the Engineer at no additional cost to the Owner. Injection grouting may be required to stop leaks around or in invert channels, pipe connections and benches.
3. The Engineer's decision on how defective lining shall be final. If any defective lining after it has been installed or during the warranty period, it shall be repaired or replaced in a manner satisfactory to the Engineer and at no additional cost to the Owner.
4. Payment shall not be made for the installed lining until:
 - a. The manhole passes the vacuum test
 - b. The final post-rehabilitation CCTV showing installed CIPP connecting to the manhole as specified elsewhere in the Specification.

F. Reference Standards

The following American Society for Testing and Materials (ASTM) standards are referenced herein:

ASTM C 78 Standard Test Method for Flexural Strength of Concrete

ASTM C 94 Standard Test for Ready Mix Concrete

ASTM C 109 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars

ASTM C 234 Standard Test Method for Comparing Concretes on the Basis of the Bond Developed with Reinforcing Steel

ASTM C 267 Standard Test Method for Chemical Resistance of Mortars, Grouts and Monolithic Surfaces

ASTM C 321 Standard Test Method for Bond Strength of Chemical Resistant Mortars

ASTM C 496 Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens

ASTM C 596 Standard Test Method for Drying Shrinkage of Mortars Containing Portland cement

ASTM C 666 Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing

ASTM C 882 Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear

ASTM C 952 Standard Test Method for Bond Strength of Mortar to Masonry Units

ASTM C 1244 Standard Test Method for Concrete Sewer Manholes by the Negative Pressure (Vacuum) Test

ASTM D 638 Standard Test Method for Tensile Properties of Plastics

ASTM D 790 Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics

- G. Cured-In-Place-Pipe: The materials and processes must be reasonably available for pre-inspection, during installation, and post-installation inspections. Areas which require inspection include (but are not limited to) the following:
1. Materials used in the tube should exhibit sufficient transparency enough to allow visual inspection to assure the quality of resin-impregnation.
 2. Temperature-sensing devices, such as thermocouples, shall be located between the existing pipe and the CIPP pipe to ensure complete cure of the entire wall thickness. After completion of the lining process and reinstatement of service connections, the installation shall be inspected with a 360° integral lighthouse camera. This post-installation television inspection is to take place within 24-hours after completion of each section. No Work shall be accepted that fails this post-installation television inspection. Post installation videos shall be provided to the Owner within 24-hours after their completion. Post construction videos shall be submitted to the Owner before final invoices, including retainage, are released.
 3. All workmanship and materials will meet the standards of the industry. The finished CIPP shall be continuous over the length of pipe between two manholes and shall be an impermeable, joint-less conduit, free from visual defects such as foreign inclusions, dry spots, pin holes, lifts, or delamination. Wrinkles in the CIPP, (other than minor, longitudinal pressure wrinkles) will not be acceptable. The Owner/Engineer shall determine as to the acceptability of pressure wrinkling with that decision being final. In the event the finished liner does not fit tightly against the original pipe at its termination point(s), the space between the liner and

the pipe shall be made watertight, utilizing manhole end seals, hydro-tite gaskets, or approved equal.

H. Acceptance Testing of CIPP

1. The Owner/Engineer may, at their discretion, direct the Contractor to collect samples of the cured CIPP for laboratory determination of flexural strength, flexural modulus and wall thickness for each test sample during the execution of this Contract. These three individual analyses shall comprise one completed test. All samples shall be collected per the sampling protocols set forth in ASTM F-1216.
2. Upon notification by the Engineer, the Contractor shall remove one restrained sample of the installed liner at least 12 inches in length for testing. For sewers 15 inches and larger, plate samples may be taken and cured in the same water as the installed CIPP. For each sample taken, the Contractor shall cut and deliver a 1-inch wide representative sample (taken at least 2 inches from the end of the specimen) to the Engineer. The sample delivered to the Engineer shall be labeled and removed from any restraining mold. The Engineer may return such samples to the Contractor for disposal.
3. The tests shall be used to verify that the installed CIPP meets these specifications. CIPP thickness shall be measured in accordance with ASTM D5813. Flexural properties shall be determined per ASTM D790. The Contractor shall label and date all samples and deliver the samples directly to the Owner/Engineer. All testing shall be performed by an independent, ASTM-certified testing laboratory of the Owner/Engineer's designation and at the Owner's expense. Payment to the Contractor shall be withheld pending the Owner/Engineer's acceptance of the CIPP test results.F
4. Any liner that does not meet the specified strength and/or thickness requirements, regardless of the amount below the specified requirements, shall be corrected by the Contractor in a manner approved by the Owner/Engineer at no additional cost to the Owner. The Owner/Engineer's decision on how to correct deficient CIPP installations shall be final.

3.07 Protection and Restoration Of Work Area

- A. General: Return all items and all areas disturbed, directly or indirectly by work under these Specifications, to their original condition or better, as quickly as possible after work is started.
1. The Contractor shall plan, coordinate, and prosecute the work such that disruption to personal property and business is held to a practical minimum.
 2. Prepare photographic documentation of sensitive areas along the project route/site to document conditions existing prior to project construction.
 3. All construction areas abutting lawns and yards of residential or commercial property shall be restored promptly. Backfilling of underground facilities, ditches, and disturbed areas shall be

- accomplished on a daily basis as work is completed. Finishing, dressing, and grassing shall be accomplished immediately thereafter, as a continuous operation within each area being constructed and with emphasis placed on completing each individual yard or business frontage. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.
4. Handwork, including raking and smoothing, shall be required to ensure that the removal of roots, sticks, rocks, and other debris is removed in order to provide a neat and pleasing appearance.
 5. The County or the Georgia Department of Transportation will be authorized to stop all work by the Contractor on its right-of-way when restoration and cleanup are unsatisfactory and to require appropriate remedial measures.
- B. Man Made Improvements: Protect, or remove and replace with the Engineer's approval, all fences, walkways, mail boxes, pipe lines, drain culverts, power and telephone lines and cables, property pins and other improvements that may be encountered in the work.
- C. Cultivated Growth: Do not disturb cultivated trees or shrubbery unless approved by the Engineer. Any such trees or shrubbery, which must be removed, shall be heeled in and replanted under the direction of an experienced nurseryman.
- D. Cutting of Trees: Do not cut trees for the performance of the work except as absolutely necessary. Protect trees that remain in the vicinity of the work from damage from equipment. Do not store spoil from excavation against the trunks. Remove excavated material stored over the root system of trees within 30 days to allow proper natural watering of the root system. Repair any damaged tree over 3 inches in diameter, not to be removed, under the direction of an experienced nurseryman. All trees and brush that require removal shall be promptly and completely removed from the work area and disposed of by the Contractor. No stumps, wood piles, or trash piles will be permitted on the work site.
- E. Disposal of Rubbish: Dispose of all materials cleared and grubbed during the construction of the project in accordance with the applicable codes and rules of county, state and federal regulatory agencies.
- F. Swamps and Other Wetlands
1. The Contractor shall not construct permanent roadbeds, berms, drainage structures or any other structures, which alter the original topographic features within the easement.
 2. All temporary construction or alterations to the original topography will incorporate measures to prevent erosion into the surrounding swamp or wetland. All areas within the easement shall be returned to their original topographic condition as soon as possible after work is completed in the area. All materials of construction and other non native materials shall be disposed by the Contractor.
 3. The Contractor shall provide temporary culverts or other drainage structures, as necessary, to permit the free migration of water between

portions of a swamp, wetland or stream, which may be temporarily divided by construction.

4. The Contractor shall not spread, discharge or dump any fuel oil, gasoline, pesticide, or any other pollutant to adjacent swamps or wetlands.
- G. Bypassing or spilling wastewater onto the ground, into the trench, or into adjacent waters is prohibited.
- H. Dust Control: The Contractor shall use all means necessary to control dust on and near the work, and on and near all off-site borrow areas when dust is caused by the operations during performance of the work or if resulting from the condition in which the subcontractor leaves the site. The Contractor shall thoroughly moisten all surfaces as required to prevent dust being a nuisance to the public, neighbors, and concurrent performance of work on the site.

END OF SECTION

Section 02735 Sewer Service Connection

1.01 Scope

The work covered by this Section shall consist of furnishing and installing service connections in the sewers, of the size and type shown on the Drawings and specified herein.

Part 2 Products

2.01 Materials

- A. Service connections shall be made at the top or from the side at 45 degrees of the sewer line using 8-inch diameter pipe as shown on the Drawings. Service pipe shall be of the same material and quality as the main sewer line.
- B. Riser connections shall be required when the main sewer line is 10 feet or more below finished grade, unless otherwise directed by the Engineer.
- C. The service connection shall extend from the sewer line to the edge of the permanent easement or right-of-way and be plugged.
- D. If the service connection ends in rock, the Contractor shall excavate the rock an additional 10 feet beyond the plugged end.
- E. Connection of service lines or risers to sewer line shall be by means of standard tees or wyes, or as indicated on the Drawings.

Part 3 Execution

3.01 Installation

Install standard wye in locations shown on drawings or where designated by the Engineer. Install 6" DIP service line up to right-of-way with clean out connections. Clean out riser pipe shall stop at 4 inches above ground surface and shall have threaded-in cap. Record the location of wye connection and clean out on a copy of the contract drawings to be submitted as Record drawings, and on the report form provided by the County.

END OF SECTION