



## CITY OF ATLANTA

Kasim Reed  
Mayor

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DEPARTMENT OF PROCUREMENT  
Adam L. Smith, Esq., CPPO, CPPB, CPPM, CPP,  
CIPC, CISCC, CIGPM, CPPC  
Chief Procurement Officer  
[asmith@atlantaga.gov](mailto:asmith@atlantaga.gov)

March 10, 2016

Dear Bidders:

**Re: FC-8690, Permanent Solution to Sewer force Main Break at  
Hartsfield-Jackson Atlanta International Airport**

Attached is one (1) copy of **Addendum No. 3**, which is hereby made a part of the above-referenced project.

For additional information, please contact Mr. Philippe Jefferson, Contracting Officer, at (404) 865-8565, or via e-mail at [pejefferson@atlantaga.gov](mailto:pejefferson@atlantaga.gov).

Sincerely,

Adam L. Smith

ALS:pej



**Addendum No. 3**

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This Addendum forms a part of the Invitation to Bid and modifies the original solicitation package and any prior addenda as noted below:

- **QUESTIONS AND ANSWERS- TOTAL OF TWENTY-FIVE (25).**
- **REVISION TO PART 1; INFORMATION AND INSTRUCTIONS TO BIDDERS – 3. MINIMUM QUALIFICATIONS**
- **REVISION TO EXHIBIT “B” CONSTRUCTION CONTRACT SPECIAL CONDITIONS – SC-02 COMMENCEMENT, PROGRESS AND COMPLETION OF THE WORK AND SC-03 LIQUIDATED DAMAGES**
- **REVISION TO EXHIBIT “C” QUANTITIES, PRICING AND DATA**
- **REVISION TO EXHIBIT “D” OWNER CONTROLLED INSURANCE PROGRAM (OCIP) MANUAL**

**Addition: Insurance information Form (Pages 1 & 2), attached to this Addendum No. 3**

- **REVISION TO EXHIBIT “E” SCOPE OF WORK AND TECHNICAL SPECIFICATIONS**
- **REVISION TO EXHIBIT “F” INDEX OF DRAWINGS - PLAN CO.1.1**
- **REVISION TO EXHIBIT “F” INDEX OF DRAWINGS - PLAN C3.1.1**

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Bids are due **Wednesday, March 23, 2016**, should be time stamped in no later than 2:00 p.m., and delivered to the address below:

Adam L. Smith, Esq., CPPO, CPPB, CPPM, CPP, CIPC, CISCC, CIGPM, CPPC  
 Chief Procurement Officer  
 Department of Procurement  
 55 Trinity Avenue, S.W.  
 Suite 1900  
 Atlanta, Georgia 30303

**\*\* All other information remains unchanged \*\***

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**Acknowledgment of Addendum No. 3**

Bidders must sign below and return this form with Bids to the Department of Procurement, 55 Trinity Avenue, City Hall South, Suite 1900, Atlanta, Georgia 30303 as acknowledgment of receipt of this Addendum.

This is to acknowledge receipt of Addendum No. 3 for **FC-8690, Permanent Solution to Sewer force Main Break at Hartsfield-Jackson Atlanta International Airport** on this the \_\_\_\_\_ day of \_\_\_\_\_, 2016.

\_\_\_\_\_  
Legal Company Name of Proponent

\_\_\_\_\_  
Signature of Authorized Representative

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date



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The following questions and/or clarifications were requested by various Contractors:

1.	Question	Bidder respectfully requests that 3.2 of the minimum qualifications under the Invitation to Bid Project FC-8690 be amended to read: <b>"Each Bidder participating in this procurement must have and submit a valid Georgia Utility License for either itself or the performing subcontractor." Specification reference: Section 3.2</b>
	Answer	<i>The prime contractor in this case a joint venture, only one of the prime contractors has to have a utility license (when there is 75% or more utility work).</i>
2.	Question	Can we re-use existing 12" and 18" Bypass HDPE lines? Specification reference GC 29.4
	Answer	<b>Yes.</b>
3.	Question	Our landscape subcontractors state "Asphalt Spray Mulching" is no longer used / available. Will Owner provide Alternate? Specification reference T-908 Pg. 1 of 2
	Answer	<b>No, there will not be an alternate provided. Asphalt spray mulch is commonly used on airport projects.</b>
4.	Question:	Section D-753 (Sliplining Method) states the HDPE shall have a minimum wall thickness of DR 17. However, per Section D-750 (Sanitary Sewers), HDPE is to have a DR of 11 for directional bore applications and a DR of 17 for open trench installations, implying that trenchless applications will require thicker pipe. Should a thicker HDPE pipe (DR 11) be required for all trenchless applications, such as sliplining?
	Answer:	<b>No.</b>
5.	Question:	Section D-753 (Sliplining Method) lists Fusible PVC® pipe, HDPE, and Centrifugally Cast Fiberglass Reinforced Plastic pipe as allowed materials that can be considered for sliplining contingent upon approval by the Owner. With Fusible PVC® pipe already an approved product, can 16" DR25 Fusible PVC® pipe be considered as an equal material to the 18" DIPS HDPE currently specified in the plans, Bid Item D-753-1? This would provide a greater inside diameter and similar pressure class to the



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		details, as well as the attached project profiles for examples of Fusible PVC® pipe installations in Georgia and in slipline applications.
	<b>Answer:</b>	<b><i>A fusible PVC pipe of equal free open cross sectional area, equal wall thickness and equal bend radius to the specified DR17 HDPE pipe may be considered.</i></b>
6.	<b>Question:</b>	The current HDPE bypass that is in place from Lift Sta #1 to MH S2-3, does this line re-main after construction? Who is responsible for removal? Can the contractor use this bypass HDPE pipe for other bypass methods?
	<b>Answer:</b>	<b><i>No, the referenced existing 12" HDPE bypass pipe shall not remain after construction. The Contractor shall remove the HDPE pipe under provisions set forth in Addendum No. 3. Yes, the Contractor may utilize the HDPE pipe for other bypass methods, as indicated in the Bid.</i></b>
7.	<b>Question:</b>	The current HDPE bypass that is in place from Forrest Parkway to Flint River Pumping Sta: Can the contractor re-use this bypass HDPE pipe for other bypass needs on the project?
	<b>Answer:</b>	<b><i>Yes.</i></b>
8.	<b>Question:</b>	Is the City responsible for all cost for the current bypass operation for the duration of the construction?
	<b>Answer:</b>	<b><i>Yes, the operation of the 12" and 18" bypass systems shall be maintained by the City until the Contractor has completed enough approved work to remove the bypass from operation.</i></b>
9.	<b>Question:</b>	Spec Section D-753 Sliplining Method – Part 1 General, 01 Scope, paragraph 1 states: "This specification shall cover the rehabilitation of existing gravity sanitary sewers and sewer service laterals." Does this Specification section apply since the sliplining work is taking place in an existing sanitary Force Main system?
	<b>Answer:</b>	<b><i>Please see revised Specification D-753 attached to this Addendum No. 3.</i></b>



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10.	Question:	Spec Section D-753 Sliplining Method – Part 3 Execution, 01 Existing Utilities and Obstructions, and 02 Sewer Service Connections: These sections reference Section 02730? We do not find this section, please provide.
	Answer:	<b><i>Please see revised Specification D-753 attached to this Addendum No. 3.</i></b>
11.	Question:	Spec Section D-752 Cured-In-Place Pipe Liner – Part 3 Execution, 04 Pre-Installation procedures, 7)e) states: “The Contractor shall perform any necessary external point repairs to remove structural collapse, unacceptable liner deformation, blockages or to correct liner sags etc., as required by the Engineer.” How will the Contractor be compensated for this work, since the amount and extent of this is unknown at this time?
	Answer:	<b><i>Please see revised Specification D-752 attached to this Addendum No. 3. The contractor will not receive any compensation for corrective action required due to means and methods of construction. Existing unforeseen conditions that may be encountered that require external point repairs shall be addressed by project contingency items, as indicated in the Agreement.</i></b>
12.	Question:	Spec Section D-753 Sliplining, Part 3 Execution, 07) Correction of Pipe Sag or Blockage states: “Correction will be accomplished by point repairs as directed by the Engineer.” How will the Contractor be compensated for this work, since the amount and extent is unknown at this time?
	Answer:	<b><i>Please see revised Specification D-753 attached to this Addendum No. 3. The contractor will not receive any compensation for corrective action required due to means and methods of construction. Existing unforeseen conditions that may be encountered that require external point repairs shall be addressed by project contingency items, as indicated in the Agreement.</i></b>
13.	Question:	Bid Item P-156-1 Sediment / Erosion Control is a Lump Sum item. We do not find any Erosion Control drawings. Will the City provide these drawings? Is the Contractor responsible for all design of erosion control plans?
	Answer:	<b><i>The erosion control plan will be designed by the contractor winning the bid, submitted to DOA for review and approval. It will then be implemented by the contractor all under bid item P-156-1.</i></b>



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14.	Question:	Bid Items D-750-12 and D-750-13 Jack and Bores, if rock is encountered, will this be treated as a “change or conditions” and paid through Force Account?
	Answer:	<b><i>Any change to the Contract will be in according to GC 37 Change Documents.</i></b>
15.	Question:	Is the Add Alternate #1 “Contractor’s Insurance Cost” for if the City decides not make this an OCIP project?
	Answer:	<b><i>This will be a OCIP project.</i></b>
16.	Question:	Please provide information on the average and peak flows for each of the pump stations involved in the project. Please also provide information of the peak flows of the pump stations during rain events.
	Answer:	<b><i>Lift Station No 1      Max. flow = 2000gpm      Avg. flow = 500 gpm Lift station No. 2      Max flow = 4500 gpm      Avg. flow = 1125 gpm College park Lift Station Max Flow = 4000 gpm Avg. flow = 990 gpm</i></b>
17.	Question:	Will the City consider extending the duration of the job to substantial completion to 270 days? The 180 days allowed by the contract is tight considering the 60-90 days of paperwork required to begin.
	Answer:	<b><i>No, 240 days calendar from Notice to Proceed, (NTP) is estimated date of substantial completion, final acceptance 270 days after NTP.</i></b>
18.	Question:	Will the City consider adding a bid item for Jack & Boring through Rock?
	Answer:	<b><i>No, any change to the contract will be in according to GC 37 Change Documents.</i></b>
19.	Question:	Please provide any existing sewer line TV inspection videos the city may have.
	Answer:	<b><i>Any video material that the city has is too old to be of any value to this project.</i></b>



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20.	Question:	Will the Contractor be compensated for exporting unsuitable material from the jobsite?
	Answer:	<b><i>Reference specification P-152, page 1 of 11, Section "01) Description", Subsection "c) Classifications", paragraph 3.</i></b>
21.	Question:	Will the Contractor become responsible for operation and maintaining the existing bypass pumping system once the project commences, or will it remain under the control and responsibility of the City?
	Answer:	<b>No, the Contractor will not become responsible for the operation and maintenance of the existing bypass pumping system upon commencing the project. The operation of the 12" and 18" bypass systems shall be maintained by the City until the Contractor has completed enough approved work to remove the bypass from operation. See Plan C3.1.1 note number 1 (revised by Addendum No. 3) and note number 8.</b>
22.	Question:	Who will be responsible for removing the above ground existing bypass pumping system?
	Answer:	<b><i>The Contractor.</i></b>
23.	Question:	Are there temporary easements acquired for the bypass pumping system? Are there limits to where this bypass pumping system may be located?
	Answer:	<b><i>No, provided that roadway or other vehicular traffic is not impeded in any way by the Contractor's means and methods and Contractor abides by Agreement's terms.</i></b>
24.	Question:	One of the JV partners must be a certified SBE with the City of Atlanta. Is this correct?
	Answer:	<b>Yes.</b>
25.	Question:	Do the same experience qualifications apply to the slip lining contractor as do the CIPP contractor?
	Answer:	<b><i>No. Please refer to Technical Specification D-752 and D-753, attached to this Addendum #3.</i></b>



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**THE FOLLOWING ARE CHANGES AND/OR MODIFICATIONS TO THE BID DOCUMENTS**

**1. REVISION TO PART 1; INFORMATION AND INSTRUCTIONS TO BIDDERS – 3. MINIMUM QUALIFICATIONS**

Delete: 3.5. The Cured In Place Pipe lining and/or sliplining system installer shall meet the following minimum experience requirements:

Replace with: *3.5. The Cured In Place Pipe lining system installer shall meet the following minimum experience requirements:*

**2. REVISION TO EXHIBIT “B” CONSTRUCTION CONTRACT SPECIAL CONDITIONS – SC-02 COMMENCEMENT, PROGRESS AND COMPLETION OF THE WORK AND SC-03 LIQUIDATED DAMAGES**

Delete: 2.2 Intermediate Milestones.

NO.	CONTRACT MILESTONES
1.	CONTRACTOR shall achieve Substantial Completion on or before <b>One Hundred and Eighty (180) Calendar Days from Notice to Proceed.</b>
2.	CONTRACTOR shall provide O&M manuals, warranties and As-Builts within <b>Thirty (30) calendar days</b> from the date of substantial completion of the entire project.

Replace with: 2.2 Intermediate Milestones

NO.	CONTRACT MILESTONES
1.	<i>CONTRACTOR shall achieve Substantial Completion on or before <b>Two Hundred and Forty (240) Calendar Days from Notice to Proceed.</b></i>
2.	<i>CONTRACTOR shall achieve Final Completion on or before <b>Two Hundred and Seventy (270) Calendar Days from Notice to Proceed.</b></i>



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<b>3.</b>	<b><i>CONTRACTOR shall provide O&amp;M manuals, warranties and As-Builts within Thirty (30) calendar days from the date of substantial completion of the entire project.</i></b>
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**Delete: 3.1 Estimated Liquidated Damages**

NO.	BASE BID CONTRACT MILESTONES	LIQUIDATED DAMAGES
1.	CONTRACTOR shall achieve Substantial Completion on or before <b>One Hundred and Eighty (180) Calendar Days from Notice to Proceed.</b>	Two Thousand Dollars and Zero Cents (\$2000.00) per calendar day.
2.	CONTRACTOR shall provide O&M manuals, warranties and As-Builts within <b>Thirty (30)</b> calendar days from the date of substantial completion of the entire project.	Five Hundred Dollars and Zero Cents (\$500.00) per calendar day.

**Replace with: 3.1 Estimated Liquidated Damages**

NO.	BASE BID CONTRACT MILESTONES	LIQUIDATED DAMAGES
1.	<b><i>CONTRACTOR shall achieve Substantial Completion on or before Two Hundred and Forty (240) Calendar Days from Notice to Proceed.</i></b>	<b><i>Two Thousand Dollars and Zero Cents (\$2000.00) per calendar day.</i></b>
2.	<b><i>CONTRACTOR shall achieve Final Completion on or before Two Hundred and Seventy (270) Calendar Days from Notice to Proceed.</i></b>	<b><i>Two Thousand Dollars and Zero Cents (\$2000.00) per calendar day.</i></b>
3.	<b><i>CONTRACTOR shall provide O&amp;M manuals, warranties and As-Builts within Thirty (30) calendar days from the date of substantial completion of the entire project.</i></b>	<b><i>Five Hundred Dollars and Zero Cents (\$500.00) per calendar day.</i></b>

**3. REVISION TO EXHIBIT “C” QUANTITIES, PRICING AND DATA**

Delete: Exhibit C- “Form A-1 Schedule of Unit & Lump Sum Prices”, in its entirety.



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**Replace with:** *Exhibit C-“Form A-1 Schedule of Unit & Lump Sum Prices”, attached to this Addendum No. 3.*

**4. REVISION TO EXHIBIT “D” OWNER CONTROLLED INSURANCE PROGRAM (OCIP) MANUAL**

**Addition:** Insurance information Form (Pages 1 & 2), attached to this Addendum No. 3

**5. REVISION TO EXHIBIT “E” SCOPE OF WORK AND TECHNICAL SPECIFICATIONS**

Delete: Section P-150- “Removal of Pavements and Miscellaneous Items”, in its entirety.

**Replace With:** *Section P-150 -“Removal of Pavements and Miscellaneous Items”, attached to this Addendum No. 3.*

Delete: Section D-752 - “Cured-In-Place Pipe Liner”, in its entirety.

**Replace With:** *Section D-752 -“Cured-In-Place Pipe Liner”, attached to this Addendum No. 3.*

Delete: Section D-753 - “Sliplining Method”, in its entirety.

**Replace With:** *Section D-753 -“Sliplining Method”, attached to this Addendum No. 3.*

**6. REVISION TO EXHIBIT “F” INDEX OF DRAWINGS - PLAN CO.1.1**

Delete: P-150-4 Removal of Pipe, 18” HDPE (Above Ground) LF 4800

**Replace with:** *P-150-4 Removal of Pipe, 12” or 18” HDPE (Above Ground) LF 5800*



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**7. REVISION TO EXHIBIT "F" INDEX OF DRAWINGS - PLAN C3.1.1**

Delete: CONTRACTOR MAY UTILIZE EXISTING OWNER-PROVIDED ABOVE GROUND BYPASS PIPING IN EXISTING CONFIGURATION TO FACILITATE THE PROPOSED 12" FORCE MAIN INSTALLATION AND ALSO THE 18" CIPP REHABILITATION BETWEEN LIFT STATION 1 AND EXISTING MANHOLE S1-9.

***REPLACE WITH: CONTRACTOR MAY UTILIZE EXISTING OWNER-PROVIDED ABOVE GROUND BYPASS PIPING IN EXISTING CONFIGURATION TO FACILITATE THE PROPOSED 12" FORCE MAIN INSTALLATION AND ALSO THE 18" CIPP REHABILITATION BETWEEN LIFT STATION 1 AND EXISTING MANHOLE S1-9. AFTER THE OWNER HAS ACCEPTED THE PROPOSED 12" FORCE MAIN INSTALLATION AND ALSO THE REFERENCED 18" CIPP REHABILITATION INSTALLATION THE CONTRACTOR SHALL TAKE POSSESSION OF THE EXISTING ABOVE GROUND 12" HDPE BYPASS PIPE AND REMOVE IT FROM SITE.***



**CITY OF ATLANTA  
DEPARTMENT OF AVIATION  
HARTSFIELD-JACKSON ATLANTA INTERNATIONAL AIRPORT**

**FC-8690  
PERMANENT SOLUTION TO SEWER FORCE MAIN BREAK**

**EXHIBIT "C"  
FORM A-1 SCHEDULE OF UNIT & LUMP SUM PRICES**

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
SP-1-1	LUMP SUM	LS, MOBILIZATION, AT _____ _____ PER LUMP SUM				
SP-2-1	ALLOWANCE	AS REQUIRED, PROJECT CONTINGENCY, AT _____ _____ PER ALLOWANCE			500,000	00
SP-4-1	LUMP SUM	LS, TRAFFIC CONTROL, AT _____ _____ PER LUMP SUM				
SP-5-1	LUMP SUM	LS, UTILITY COORDINATION AND SCHEDULING, AT _____ _____ PER LUMP SUM				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
SP-7-1	LUMP SUM	LS, AS-BUILTS , AT  _____ _____  PER LUMP SUM				
SP-8-1	ALLOWANCE	AS REQUIRED, PROJECT CONTINGENCY / EMERGENCY SERVICES , AT  <u>ZERO DOLLAR AND ZERO CENT</u> _____ _____  PER ALLOWANCE	—	—	0	00
P-150-1	90	LF,REMOVAL OF CHAIN LINK FENCE , AT  _____ _____  PER LINEAR FOOT				
P-150-2	860	LF,REMOVAL OF PIPE, 12" DIP , AT  _____ _____  PER LINEAR FOOT				
P-150-3	330	LF,REMOVAL OF PIPE, 14" DIP , AT  _____ _____  PER LINEAR FOOT				
P-150-4	5800	<i>LF,REMOVAL OF PIPE, 12" or 18" HDPE (Above Ground), AT</i>  _____ _____  <i>PER LINEAR FOOT</i>				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
P-150-5	3500	LF,REMOVAL OF PIPE, 24" DIP , AT _____ _____ PER LINEAR FOOT				
P-150-6	180	LF,REMOVAL OF PIPE, 36" RCP , AT _____ _____ PER LINEAR FOOT				
P-150-7	1	EA,REMOVAL OF EXISTING AIR RELEASE VALVE AND MANHOLE , AT _____ _____ PER EACH				
P-150-8	1	EA,REMOVAL OF EXISTING AIR RELEASE VALVE WITHIN MANHOLE TO REMAIN , AT _____ _____ PER EACH				
P-150-9	LUMP SUM	LS, RELOCATE EXIST. STEEL ROAD RAMP BYPASS , AT _____ _____ PER LUMP SUM				
P-152-1	17500	CY, SITE EXCAVATION , AT _____ _____ PER CUBIC YARD				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
P-152-2	50	CY, BACKFILL, AT <hr/> <hr/> PER CUBIC YARD				
P-152-3	1100	SY, PREPARATION OF SUBGRADE , AT <hr/> <hr/> PER SQUARE YARD				
P-152-4	65	CY, TRENCH ROCK EXCAVATION , AT <hr/> <hr/> PER CUBIC YARD				
P-156-1	LUMP SUM	LS, SEDIMENT/EROSION CONTROL , AT <hr/> <hr/> PER LUMP SUM				
P-209-1	250	CY, CRUSHED AGGREGATE FOR ACCESS ROADS, INCLUDING CALCIUM CHORIDE, AT <hr/> <hr/> PER CUBIC YARD				
F-162-1	50	LF, 8' BLACK PVC COATED FENCE WITH EXTENSION ARMS AND 3 STRANDS OF BARBED WIRE, AT <hr/> <hr/> PER LINEAR FOOT				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
F-162-2	2	EA, TEMPORARY DOUBLE-LEAF SWING GATE, BLACK PVC-COATED, 24' OPENING, AT  _____  _____  PER EACH				
F-162-3	1	EA, 8' BLACK PVC COATED FENCE FABRIC REPAIR, AT  _____  _____  PER EACH				
F-162-4	1	EA, PERMANENT DOUBLE-LEAF SWING GATE, GALVANIZED, 24' OPENING, AT  _____  _____  PER EACH				
F-162-5	3	EA, 8' GALVANIZED FENCE FABRIC REPAIR, AT  _____  _____  PER EACH				
D-750-1	1000	LF, SANITARY SEWER, 12" HDPE 3608 DR 17 DIPS, AT  _____  _____  PER LINEAR FOOT				
D-750-2	4	EA, SANITARY SEWER, 12" HDPE 45° FITTING WITH PCC THRUST BLOCK, AT  _____  _____  PER EACH				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
D-750-3	2	EA, SANITARY SEWER, 12" HDPE 60° FITTING WITH PCC THRUSTBLOCK, AT  _____ _____ PER EACH				
D-750-4	330	LF, SANITARY SEWER, 14" HDPE 3608 DR 17 DIPS, AT  _____ _____ PER LINEAR FOOT				
D-750-5	5700	LF, SANITARY SEWER, 18" HDPE 3608 DR 17 DIPS, AT  _____ _____ PER LINEAR FOOT				
D-750-6	2	EA, SANITARY SEWER, 24" X 18" DUCTILE IRON REDUCER, AT  _____ _____ PER EACH				
D-750-7	7000	LF, TYPE C BEDDING FOR SANITARY SEWER, AT  _____ _____ PER LINEAR FOOT				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
D-750-8	1	EA, 2" COMBINATION VALVE/BALL VALVE ASSEMBLY, AT _____ _____ PER EACH				
D-750-9	2	EA, 3" COMBINATION VALVE/BALL VALVE ASSEMBLY, AT _____ _____ PER EACH				
D-750-10	5	EA, 4" COMBINATION VALVE/BALL VALVE ASSEMBLY, AT _____ _____ PER EACH				
D-750-11	LUMP SUM	LS, TRENCH AND EXCAVATION PROTECTION, AT _____ _____ PER LUMP SUM				
D-750-12	225	LF, JACK AND BORE 24" STEEL CASING, AT _____ _____ PER LINEAR FOOT				
D-750-13	40	LF, JACK AND BORE 36" STEEL CASING , AT _____ _____ PER LINEAR FOOT				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
D-751-1	7	EA, MANHOLE (5' DIA.) FOR COMBINATION AIR/VACUUM VALVE INSTALLATION, AT  _____ _____ PER EACH				
D-751-2	1	EA, ADJUST EXISTING MANHOLE TO GRADE , AT  _____ _____ PER EACH				
D-751-3	1	EA, REMOVE AND REPLACE RING AND LID (2'Dia.) FOR EXISTING SANITARY SEWER MANHOLE, AT  _____ _____ PER EACH				
D-751-4	6	EA, PLUG EXISTING DUCTILE IRON PIPE (12" TO 24" DIA.), AT  _____ _____ PER EACH				
D-752-1	5800	LF, CURED IN PLACE PIPE LINING, 18" DIAMETER , AT  _____ _____ PER LINEAR FOOT				
D-753-1	3000	LF, SLIPLINING, 18" HDPE, AT  _____ _____ PER LINEAR FOOT				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
D-755-1	20	CY, PLAIN STONE RIP RAP , AT _____ _____ PER CUBIC YARD				
D-755-2	100	CY, GROUTED STONE RIP RAP, AT _____ _____ PER CUBIC YARD				
D-756-1	LUMP SUM	LS, WASTEWATER FLOW CONTROL , AT _____ _____ PER LUMP SUM				
T-901-1	13	ACRE, SEEDING, AT _____ _____ PER ACRE				
T-901-2	13	ACRE, TEMPORARY SEEDING, AT _____ _____ PER ACRE				
T-901-3	100	HR, WATERING FOR GRASSED AREAS, AT _____ _____ PER HOUR				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
T-908-1	13	ACRE, ASPHALT SPRAY MULCHING, AT _____ _____ PER ACRE				
		<b>TOTAL BASE BID</b> _____ _____				
	LUMP SUM	<u>ADDITIVE ALTERNATE #1</u> CONTRACTOR'S INSURANCE COST, AT _____ _____ PER LUMP SUM				

**City of Atlanta, Department of Aviation  
Atlanta Hartsfield International Airport Expansion Project  
Insurance Program**

**Insurance Information Form (Page 1)**

Contractor Name:  
 Subcontractor To  
 (if applicable):  
 Address:  
 Phone:  
 Project Name: \_\_\_\_\_ Contract No.: \_\_\_\_\_  
 Contract Amount: \_\_\_\_\_ Est. Payroll: \$ \_\_\_\_\_  
 Est. Start Date: \_\_\_\_\_ Est. End Date: \_\_\_\_\_

I. Workers' Compensation Information (Project Site Only):  
*(See next two pages for classification codes).*

<u>Classifications</u>	<u>W. C. Code</u>	<u>Current Rate x Payroll</u> <u>Per \$100 of Payroll</u>	<u>Premium</u>
1. _____	_____	\$ _____ X \$ _____	= \$ _____
2. _____	_____	\$ _____ X \$ _____	= \$ _____
3. _____	_____	\$ _____ X \$ _____	= \$ _____
4. _____	_____	\$ _____ X \$ _____	= \$ _____
5. _____	_____	\$ _____ X \$ _____	= \$ _____

*(Attach Worksheet if more than five codes are used)*

Totals: \$ \_\_\_\_\_ \$ \_\_\_\_\_

Experience Modifier: X  
 Modifier Premium:  
 Employers' Liability (Coverage One -B): +  
 Total Modified Premiums: \$  
 Regular Workers' Compensation Insurer:  
 \_Experience Rating Date (Policy Effective Date):  
 \_Interstate Bureau I.D. #  
 \_Federal Employer I.D.#

**City of Atlanta, Department of Aviation Atlanta  
Hartsfield International Airport Expansion Project  
Insurance Program**

**Insurance Information Form (Page 2)**

Classifications Premium	GL Code	Current Rate x Payroll Per \$100/\$1000 of Payroll
II. General Liability:		\$ _____ X \$ _____ = \$ _____
III. Excess/Umbrella Liability		\$ _____ X \$ _____ = \$ _____
IV. Completed Operations (Five Years)		\$ _____ X \$ _____ = \$ _____
V. Lower-Tier Contractor Premium (Excluding Auto):		= \$ _____
VI. Total Premium (I+II+III+IV+V):		\$ _____
VII. Overhead and Profit on Insurance Premiums:		+ \$ _____
VIII. Total Amount Excluded from Bid (VI + VII):		\$ _____

Agreement: Contractor agrees to permit the City of Atlanta or its Agent to inspect the insurance policies and payroll records used in determining the premium cost outlined above. (As per the General Conditions of the Contract).

Signed by: \_\_\_\_\_ Title: \_\_\_\_\_

Print Name: \_\_\_\_\_ Date: \_\_\_\_\_

Contractor's Insurance Broker or Agent:

Name: \_\_\_\_\_ Contact: \_\_\_\_\_

City: \_\_\_\_\_ Phone: \_\_\_\_\_  
*(Include Area Code)*

## Workers' Compensation Classification Codes

<b>Code</b>	<b>Description</b>
8601	Architect, or Engineer – Consulting
5188	Automatic Sprinkler Head Installation
5190	Cable Installation and Drivers
5403	Carpentry
5437	Carpentry-Trim and Cabinet
5610	Cleaner-Debris Removal
8810	Clerical Office Employees
5213	Concrete Construction
5221	Concrete or Cement Work-Floors, Driveways, Yards or Sidewalks and Drivers
6325	Conduit Construction – For Cables or Wires, and Wires and Drivers
5606	Contractor – Executive Supervisor
6229	Drainage or Irrigation System Construction, and Drivers
6204	Drilling NOC and Drivers
3724	Electrical Apparatus Installation or Repair, and Drivers
7538	Electrical light or Power Line Construction, and Drivers
5190	Electrical Wiring
5160	Elevator Erection or Repair
6217	Grading or Land, and Drivers
6400	Fence Erection – Metal
9521	Floor Covering Installation
6319	Gas, Steam, or Water Main Connection, and Drivers
5462	Glaziers – Away from Shop
6217	Grading or Land, and Drivers
5479	Insulation Work NOC
5057	Iron and Steel Erection
6229	Irrigation System Construction
0042	Landscape Gardening
5022	Masonry
3724	Milwright work, and Drivers
6003	Pile Driving
5183	Plumbing, and Drivers
7219	Rigging, and Drivers
6306	Sewer Construction – All Preparation, and Drivers
<b>Code</b>	<b>Description</b>

<b>5538</b>	<b>Sheet Metal Work – Shop and Outside, and Drivers</b>
<b>5703</b>	<b>Shoring (including Sheeting, Bracing, Decking, etc.)</b>
<b>3726</b>	<b>Tank Erection or Repair – Metal – Within Buildings</b>
<b>5445</b>	<b>Wallboard Installation</b>

**Other**


**SECTION P-150  
REMOVAL OF PAVEMENTS AND MISCELLANEOUS ITEMS**

01) DESCRIPTION

- a) This section consists of miscellaneous demolition and removal items, which will consist of the breaking up and removal of pavements of all types, including curb and gutter, and placement of the removed items in the proposed embankment. This scope also includes the removal and disposal of all types of storm drains, concrete drainage structures of any description, fences and guardrails, utility service lines and mains and all associated appurtenances and hardware.
- b) The contractor shall accomplish the demolition and disposal in accordance with all local, state, and federal regulations and laws in regard to hazardous or toxic materials and shall obtain any permits required to accomplish the work.

02) CONSTRUCTION

- a) Pavement removal shall consist of breaking up and removal of all types of bituminous and concrete pavements, driveways, sidewalks including base courses, as indicated on the plans or as directed by the Engineer.
- b) Removal of chain-link fences, guardrail and all signage shall consist of entire removal of the items and appurtenances, including rails, fabric, barbed wire, gates, posts, anchors, incidentals and disposal of all materials.
- c) Removal of all types of utilities shall consist of entire removal of the items and all associated utility appurtenances and hardware, such as but not limited to, valves, meters, vaults, transformer pads and incidentals and disposal of all materials. If an existing pipe or utility is encountered which is not shown on the plans, the Contractor shall notify the Engineer and receive approval prior to removal of the pipe.
- d) All existing pipes less than 12" diameter shall be removed or abandoned as designated on the plans or as directed by the Engineer. Such pipes to be abandoned shall be capped with concrete at both ends or as otherwise directed by the Engineer. Salvaged pipe shall become the contractor's property and shall be disposed of off airport property.
- e) Unless shown otherwise on plans existing pipes 12" in diameter or greater shall be removed or filled with flowable hydraulic material. If hydraulic material is used, the material shall consist of a pumpable mixture of sand and fly ash and may include a pumping aid or bentonite. There are no strength requirements for the hydraulic fill mix other than it shall be generally suitable to fill the conduit void and prevent settlement or collapse and shall not contain excessive moisture content. Salvaged pipe shall become the contractor's property and shall be disposed of off airport property.
- f) Removal of drainage structures involves the demolition and removal of such items as inlets, manholes, slope drain inlets or outlets where so indicated on the plans. Frames, grates, or other hardware appurtenant to the items to be removed shall remain the property of the City and be delivered to the Department of Aviation maintenance area or disposed of off airport property as directed by the Engineer. Embankment associated with filling of the void after manhole has been removed shall be incidental to this pay item but shall be in accordance with Specification P-152. This work will not be paid separately and will be considered incidental to other items of construction.

- g) Relocation of existing steel road ramp bypass tank structure shall consist of the disconnection from temporary above ground sanitary sewer, cleaning of all residual effluent, loading, transport, unloading at the Department of Aviation maintenance area and complete removal of existing asphalt ramp material on either side of existing location.
- h) Existing air release, air vacuum or combination valves or other hardware appurtenant to the items shown to be removed shall remain the property of the City and be delivered to the Department of Aviation maintenance area or disposed of off airport property as directed by the Engineer.

03) METHOD OF MEASUREMENT

- a) Removal of existing asphalt pavement ramps will not be measured for payment, but shall be considered incidental to the "Relocate Existing Steel Road Ramp Bypass" pay item.
- b) Removal of Existing Air Release Valve and Manhole shall be measured per each.
- c) Removal of Existing Air Release Valve within Manhole to Remain shall be measured per each.
- d) Removal of chain link fence, with or without barbed wire, regardless of height, shall be measured by the linear foot.
- e) Removal of miscellaneous drainage structures, including headwalls, inlets, slope drain inlets or outlets, shall not be counted or measured for payment.
- f) Removal of pipes, 12" diameter or greater, will be measured for payment by the linear foot.
- g) Relocate Existing Steel Road Ramp Bypass will be measured for payment per lump sum.

04) BASIS OF PAYMENT

- a) Payment shall be made at the Contract unit price for Removal of Existing Air Release Valve and Manhole. This price shall be full compensation for removing the valve, manhole/vault and for embanking the subsequent void and all incidental work necessary to complete the removal.
- b) Payment shall be made at the Contract unit price for Removal of Existing Air Release Valve within Manhole to Remain. This price shall be full compensation for removing the valve and all incidental work necessary to complete the removal.
- c) Payment shall be made at the Contract unit price for pipe removal, in sizes of 12 inch diameter or greater. This price shall be full compensation for all labor, tools, equipment and incidentals necessary to complete the work.
- d) Payment shall be made at the Contract unit price for fence removal, without distinction as to size or type. This price shall be full compensation for all labor, tools, equipment and

incidentals necessary to complete the work.

- e) Payment shall be made at the Contract unit price for Relocate Existing Steel Road Ramp Bypass. This price shall be full compensation for all labor, tools, equipment and incidentals necessary to complete the work.

Payment will be made under:

Item P-150-1 – Removal of Chain Link Fence – Per Linear Foot

Item P-150-2 – Removal of Pipe, 12" DIP – Per Linear Foot

Item P-150-3 – Removal of Pipe, 14" DIP – Per Linear Foot

**Item P-150-4 – Removal of Pipe, 12" or 18" HDPE (Above Ground) – Per Linear Foot**

Item P-150-5 – Removal of Pipe, 24" DIP – Per Linear Foot

Item P-150-6 – Removal of Pipe, 36" RCP – Per Linear Foot

Item P-150-7 – Removal of Existing Air Release Valve and Manhole – Per Each

Item P-150-8 – Removal of Existing Air Release Valve within Manhole to Remain – Per Each

Item P-150-9 – Relocate Existing Steel Road Ramp Bypass – Per Lump Sum

**END OF SECTION P-150**

**SECTION D-752  
CURED IN PLACE PIPE LINER**

**PART 1 – DESCRIPTION**

**01) SCOPE**

- a) The Work of this Section includes providing and installing a cured-in-place pipe (CIPP) liner to stabilize structural defects and corroded surfaces in circular sanitary sewer pipelines equal to or less than 24-inch diameter. All work shall be performed only as directed by the Engineer or as shown on the contract Drawings. The liner shall be smooth, hard, strong, and chemically inert. Additionally, the interior surface shall closely follow the contours of the host pipe and be tight fitting.
- b) The scope of work requires the Contractor to provide all materials, labor, equipment, and services necessary for: bypass pumping and/or diversion of sewage flows; rehabilitation of existing sanitary sewers by lining the existing pipe; construction of internal or external point repair of sewer where necessary, prior to lining; maintaining non-disruptive service to all intermediate connections; subsequent reconnection of active sewer –connection(s); facilitating watertight connections into sewers and manholes; restoring affected manhole conditions; performing initial and final cleaning; performing CCTV inspections, and final testing of the lined pipe system, all as set forth in this section and other related sections of these technical specifications.
- c) The unit bid price for rehabilitation of sewer by CIPP liner includes bypass pumping, initial CCTV inspection, initial cleaning, successful liner installation as defined by the manufacturer's recommendations, connection of the liner at the manholes, reconnection of laterals, restoring manholes, final cleaning, testing of liner samples and final CCTV inspection.

**02) RELATED SECTIONS**

- a) The Work of the following Sections specifically apply to the Work of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of Work.
  - 1) Section D-756: Wastewater Flow Control

### 03) SPECIFICATIONS AND STANDARDS

- a) Except as otherwise indicated, the current editions of the following apply to the Work of this Section:
- 1) ASTM D 256 Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
  - 2) ASTM C 581 Standard Practice for Determining Chemical Resistance of Thermosetting Resins Used in Glass-fiber-reinforced Structures Intended for Liquid Service.
  - 3) ASTM D 543 Practices for Evaluating the Resistance of Plastics to Chemical Reagents.
  - 4) ASTM D 578 Specification for Glass Fiber Strands.
  - 5) ASTM D638 Test Method for Tensile Properties of Plastics.
  - 6) ASTM D 695 Test Method for Comprehensive Properties of Rigid Plastics.
  - 7) ASTM D 790 Test Method(s) for Flexural Properties of Un-reinforced and Reinforced Plastics and Electrical Insulating Materials.
  - 8) ASTM D 903 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
  - 9) ASTM D 1682 Standard Test Methods for Determining Tube Strength.
  - 10) ASTM D 2290 Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep Rupture Practices.
  - 11) ASTM D 3567 Standard Practice for Determining Dimensions of "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe and Fittings.
  - 12) ASTM D 3839 Practice for Underground Installation of Fiberglass (Glass-Fiber-Reinforced Thermosetting Resin) Pipe.
  - 13) ASTM D 3861 Benchmark Test to Determine Waste Stream Compatibility with the CIPP Liner.

- |     |             |   |
|-----|-------------|---|
| 14) | ASTM D 4166 | Test Method for Thickness of nonmagnetic Materials by Means of a Digital Magnetic Intensity Instrument.   |
| 15) | ASTM D 5813 | Cured-In-Place Thermosetting Resin Sewer Piping Systems.  |
| 16) | ASTM D 5947 | Standard test Methods for Physical Dimensions of Solid Plastics Specimens.  |
| 17) | ASTM F 1216 | Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube.  |
| 18) | ASTM F 1743 | Rehabilitation of Existing pipelines and conduits by pulled-in-place installation of cured-in-place thermosetting resin pipe.   |
| 19) | ASTM F 2561 | Standard Practice for Rehabilitation of a Sewer Service Lateral and Its Connection to the Main Using a one-piece Main and Lateral CIPP liner  |
| 20) | ASTM F 2019 | Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastic (GRP) Cured-in-Place Thermosetting Resin Pipe (CIPP). |

#### SUBMITTALS

- a) The following shall be submitted to the Engineer in writing prior to or at the time indicated. Failure to do so will prevent progression of the Work to the next step.
- 1) CIPP system manufacturer literature (With the Bid Documents)
  - 2) Written certification from the manufacturer that the Contractor is an approved applicator of lining materials (With the Bid Documents).
  - 3) Details concerning a) location and contact information of wet out facility to facilitate wet out facility inspection(s) and b) location and contact information of third party laboratory testing facility to facilitate third party laboratory testing inspections (At Pre-Construction Meeting)
  - 4) Certified copies of manufacturer test reports on physical properties and chemical resistance of the proposed resin (At Pre-Construction Meeting).
  - 5) Information from the resin manufacturer including specifications, characteristics, properties, type test information and methods of application, including a written certification that the resin material is

appropriate for the intended application (At Pre-Construction Meeting).

- 6) Manhole Sealing and Invert Rebuilding Methods and Materials (At Pre-Construction Meeting).
- 7) CIPP Repair Methods [If Required] (Before Repairs Are Made).
- 8) Point Repair Methods [If Required] (Before Repairs Are Made)
- 9) Certified copies of test reports on CIPP samples obtained during actual installation in the presence of the Contractor (After Completion of Each Section).
- 10) Process Control Sheet to include Temperature/Time Log Information, Tap Cut Information and Curing Cycle. (After Completion of Each Section).
- 11) Physical Sample (After Completion of Each Section)
  - a) Samples removed for testing shall be individually labeled and logged to record the following:
    - 1) City's project number and title.
    - 2) Sample number
    - 3) Segment number of line as noted on plans indicating down tube and terminal manhole numbers including any intermediate manhole numbers if applicable
    - 4) Date and time of sample
    - 5) Name of contractor
  - b.
    - 1) Date, location and by whom tested
    - 2) Results of test
  - c. Samples shall be numbered as follows:
    - 1) Sample #/A: Terminal end restrained sample (every bag)
    - 2) Sample #/B: Flat plate sample (limited number).

Note that only a limited number of Flat plate samples will be randomly ordered for testing during the course of the contract by the Engineer.

Approximately 5% of the total number of liners ("bags") shall be tested, assuming the 5% sample tested satisfies test criteria.

#### 04) INSTALLER QUALIFICATIONS

- a) The Contractor or subcontractor performing the Work of this section shall be employees of the company manufacturing the CIPP system components or shall be licensed by the repair system manufacturer. The system installer shall meet the following minimum experience requirements:
  - 1) ***A minimum of five years' experience and 100,000 Linear Feet of installed lining in place with the last five years.***
  - 2) ***The Contractor/subcontractor's proposed superintendent for the work shall have a minimum of (5) five years' experience with (3) three years as a superintendent performing installation of the specified lining system.***
- b) It is the intent that these specifications be non-preferential and not restricting as to installation methodology or materials to a single vendor or sole source. Recognized cured-in-place-pipe liner systems are those equal to;
  - 1) Inliner CIPP, produced by Inliner Technologies, LLC.
  - 2) CIPP, produced by National Liner, LLC.
  - 3) Blue-Tek Ultra Violet CIPP, produced by Reline America, Inc.

#### 06) TRIAL TEST AND METHODOLOGY REVIEW

- a) The Contractor shall comply with the following conditions before a cured-in-place technique becomes accepted as a viable option on a repeat basis:
  - 1) A successful demonstration on a trial length of sewer pipeline, chosen by the Engineer, including type and quality control tests.
  - 2) The trial shall be measured and paid at the unit price prior to approval for adoption by the Engineer to prove that the equipment, materials and installation methodology are fully acceptable to meet local conditions.
  - 3) The finished liner installation must be sealed against any form of infiltration, especially at manholes and service lateral connections.
  - 4) The Contractor shall allow for any further requirement of the Engineer, subsequent to the trial, to modify the equipment, material and/or

installation methodology in order to complete the Work satisfactorily and meet all testing standards.

- 5) The Engineer shall formally accept the work successfully completed in the trial stage.

## PART 2 - PRODUCTS

### 01) MATERIALS

#### a) Flexible Liner or Fabric Tube

- 1) The flexible liner shall be a composite tube incorporating one or more layers of needled felt or equivalent woven or non-woven material manufactured under quality controlled conditions set by the manufacturer. If felt based, the CIPP liner tube shall conform to the requirements of ASTM F 1216 and ASTM D 5813, sections 6 and 8. If GRP based, the CIPP liner tube shall conform with the requirements of ASTM F 2019. The liner tube shall be sized so that, when installed, it will fit tightly and without twists inside the existing sewer and produce the required thickness after the resin is cured.
- 2) The flexible liner tube shall tightly fit the existing host sewer in both length and diameter, with allowance for proper longitudinal or circumferential stretching or shrinkage due to pressure or expansion being made during installation. The lining shall be fabricated in such a length that when installed, it will occupy exactly the length of the pipeline between the launch and reception manholes, and in addition, the through-flow channels of the launch, intermediate, and reception manholes, in accordance with paragraph 3.06 below. The finished CIPP liner shall be continuous and free from visual defects such as foreign inclusions, dry spots, tears, pinholes and delamination. The lining shall be of the correct diameter so that after inversion it does not wrinkle by more than 1% for linings in sewers equal to or greater than 24-inches internal diameter, and by more than 2% for linings in sewers less than 24-inches internal diameter below the spring line. Laser profiling shall be deployed at the contractors expense should wrinkles be confirmed greater than the above criteria.
- 3) The tube shall contain no intermediate layers that may delaminate after resin curing. It shall not be possible to separate any layers with a probe or knife blade such that the layers separate cleanly or the probe or knife blade moves freely between the layers. Where several layers of felt are required, the inner layer shall be stitched or spot-welded to form a tube. Each successive layer shall be individually wrapped around the previous one and spot-welded or stitched together. The outer layer of felt shall have an installation tube pre-bonded to it, or a sheet of this material shall be wrapped around the completed felt tube. Where a pre-bonded material is

used, a covering strip shall be bonded over the seam to form an airtight joint.

- 4) The dimensions of the lining shall take account of any loss of pipe wall thickness due to hydrogen sulfide corrosion and deformation of the pipe to be lined where this is less than 10% of diameter.

b) Resin

- 1) The resin used to impregnate the tube shall produce a cured tube that shall be resistant to shrinkage, shall not corrode or oxidize, and shall also be resistant to abrasion from solids, grit, and sand in wastewater.
- 2) The resin shall have proven resistance to the municipal wastewater environment that may comprise, as a minimum, all of the following factors:
  - a. Immersion in septic sewage at temperatures up to 85°F;
  - b. Exposure in hydrogen sulfide gas from septic sewage at temperatures up to 85°F;
  - c. Exposure to ultra-violet light (sunlight) at any stage prior to installation for felt. UV cured liner shall not be exposed to UV and must incorporate a non-UV-penetrable protective sleeve.
- 3) The internal wall color of the cured liner shall be white to light brown.
- 4) The chemical resistance of the resin system selected shall have been tested by the resin manufacturer in accordance with ASTM F1216, D543 or C581 as applicable. Exposure to the chemical solution listed below at temperatures of up to 85°F, shall result in a loss of not more than twenty percent (20%) of the initial physical properties when tested in accordance with ASTM D 543 for a period of not less than one year.

CHEMICAL SOLUTION	CONCENTRATION, %
Tap Water (pH 5-9)	100
Nitric Acid	5
Phosphoric Acid	10
Sulfuric Acid	10
Gasoline	100
Vegetable Oil	100
Detergent or Soap	0.1

- 5) The resin system shall be supplied by a company selected by the CIPP (liner) manufacturer. Only polyester, vinyl ester or epoxy resins complying with the following requirements shall be used:
- a) Polyester Resin: A resin created by reaction products between isophthalic/terathalic acid, maleic anhydride, and a glycol characterized by reactive unsaturation located along the molecular chain. This resin is compounded with a reactive styrene monomer and reacted together with initiators/promoters to produce cross-linked copolymer matrices. Acceptable polyester resins are Reichold PolyLite ® 334020-E, Alpha Owens Corning (AOC) 102TA or approved equal.
  - b) Vinyl Ester Resin: A resin created by reaction products of epoxy resins with methacrylic acid and characterized by reactive unsaturation located in terminal positions of the molecular chain. This resin is compounded with a reactive styrene monomer and reacted together with initiators/promoters to produce cross-linked copolymer matrices.
  - c) Epoxy Resin: A resin created by the reaction of epichlorohydrin and Bisphenol-A, Bisphenol-F (or a Novalac in some cases) to yield diglycidyl ether (triglycidyl ether in the case of Novalacs) having a terminal epoxy rings as the reactive sites. An epoxy resin system shall be composed of diglycidyl ether of Bisphenol-A or Bisphenol-F resin solution, or a mixture of both, or other epoxy terminated base resin as pre-approved by the manufacturer, and a curing agent compatible with the saturation and cure methods for cured-in-place pipe. The curing agent may be the catalytic type, an addition curing agent type, or a mixture of both, as specified and proportioned according to the manufacturer's formulation. The epoxy resin system shall be:
    - i. free from volatile organic compounds (VOC's),
    - ii. be insensitive to ultra-violet light rays. UV cured liner shall not be exposed to UV and must incorporate a non-UV-penetrable protective sleeve.
    - iii. low odor and,
    - iv. meet DOT flash point classification as combustible liquid, or higher.
- c) Catalyst system
- 1) The resin/catalyst and corresponding CIPP and corresponding cure schedule shall be included with the resin product data submittal.
  - 2) The mixture ratio of resin and catalyst shall be approved by the resin

manufacturer in writing with the catalyst identified by product name. Resins, catalysts and resin/catalyst mix ratios shall not be altered during the performance of the work unless specifically approved by the Engineer in writing. Copies of all resin shipping documents indicating chain of custody, dates of shipment, etc. shall be provided upon request by the Engineer.

- 3) The proposed curing schedule and curing procedures shall be certified by the resin manufacturer. Cure schedules shall include specific temperature values and duration for the gel time, initial cure, exotherm, post cure and cool down phases of curing.
- 4) Curing may be accomplished by water, steam or ultraviolet light and shall be in accordance with the liner manufacturer's instructions.

d) CIPP Properties

- 1) The CIPP after curing shall meet the minimum structural properties listed below:

PROPERTY	REFERENCE	MINIMUM VALUE
Flexural Strength	ASTM D 790	4,500 psi
Short Term Flexural Modulus of Elasticity	ASTM D 790	250,000 psi
Wall Thickness	ASTM D 5813	0.35 Inches

e) CIPP Thickness

- 1) The wall thickness of the cured-in-place pipe (CIPP) liner shall be the strictest (thickest) thickness shown on the bid form in relation to the liner type, i.e., Felt based or GRP based liner, for each host pipe diameter, unless otherwise approved by the Engineer. Any alternative wall thicknesses proposed for consideration by the Engineer shall be based on the generally accepted pipe formula and anticipated potential modes of failure.
- 2) Design parameters shall include, but are not limited to, pipe wall material strength, long term strength required to provide fifty (50) year design life, 120 LB/CF earth loads, groundwater loads with groundwater level at grade, modulus of soil reaction for pipe zone backfill material @ 1000 PSI, live loads, condition of existing pipe being lined, missing section geometry of existing pipe, localized or structural defects in the existing pipe and include a minimum overall safety factor of 2.0. The design selection shall, at a minimum, be capable of resisting buckling stresses and flexural stresses

from external loads and ring tension and deflection failure from internal loads such that deflection along any diameter of the cross section does not exceed ten (10) percent of the nominal inside diameter of the pipe being lined. If a determination is made that the existing pipe being lined is fully deteriorated and provides no support to the composite existing pipe/liner system, the equation for wall thickness (buckling) shall be based on equation X1.3 set forth in ASTM F 1216, Appendix X1. In no case shall the wall thickness of the liner as installed be less than the specified thickness indicated with the bid proposal sheet unless specifically approved and directed by the Engineer.

- 3) The final, i.e., installed, thickness of the CIPP liner shall be no less than the thickness given in the bid form. Thickness greater than required shall not be allowed if this results in an undesirable loss of hydraulic capacity. The required thickness shall be measured accurately using properly calibrated calipers in accordance with ASTM D 5813. Flexural testing shall be performed in accordance with ASTM D 790 and ASTM D 5947.

f) Pre-Liner

- 1) At all locations where the CIPP Resin impregnated flexible liner tube is to be inverted into the host pipe, a pre-liner shall be pre-installed. The pre-liner is required to minimize resin loss, maintain uniform liner thickness, mitigate odor migration up service connections, facilitate liner tube installation where host pipe joints are open and differential, structural defects are jagged and likely to cause snagging, and to prevent blocked or plugged services and laterals.
- 2) The pre-liner tube shall be reinforced polymeric sheet formed into a tube sized to fit the host pipe being lined and shall be continuous with the proposed liner in length from manhole to manhole. Installation of the pre-liner shall be carried out in the presence of the Engineer. The pre-liner may be integral with the flexible liner tube. Also for winched in place liners a pre-installed sliding foil shall be used whether or not an integrated pre-liner has been incorporated in the liner.
- 3) During thickness testing, the pre-liner tube shall be removed from the thickness core sample along with any inner liner film used
- 4) The pre-liner shall be non-porous, completely free from pin holes and bubbles, air-tight and impervious to resins even when inflated to 20% over its normal size (ID of host pipe).

g) Manufacturer Facility and/or Wet-Out Facility Inspection(s)

Contractor shall allow in bid costs for travel to as well as safe and comprehensive inspection of the manufacturer facility and/or wet-out facility by

the Engineers representative(s) upon request by the Engineer following the receipt of a CIPP repair methodology submittal from the Contractor.

h) Third Party Testing Laboratory inspection

Contractor shall allow in bid costs for travel to as well as safe and comprehensive inspection of the third party testing laboratory by the Engineers representative(s) upon request by the Engineer following the receipt of a CIPP lining methodology submittal from the Contractor.

### PART 3 - EXECUTION

#### 01) SUPERVISION OF WORK

- a) The Contractor shall perform the work with oversight of an Airport Construction Management Inspector for the duration of the installation.

#### 02) DELIVERY, STORAGE, AND HANDLING

- a) If the flexible tube is impregnated with resin at the factory, it shall be transported, installed, and cured before expiration of the shelf life.
- b) Impregnated liner tube shall be stored and transported in accordance with the strictest requirements of pipe manufacturer.
- c) No cuts, tears, or abrasions shall occur during handling. The Engineer may inspect the tube on site before it is placed into the host pipe.

#### 03) TEMPORARY FLOW BYPASS AND DIVERSION PUMPING

- a) Temporary Bypass Pumping shall be carried out in accordance with Specification Section D-756.

#### 04) PRE-INSTALLATION PROCEDURES

- a) All requisite pre-installation submittals shall be approved.
- b) Perform pre-conditioning of the pipe section, including preparatory cleaning, corrosion removal, removal of grease buildup, or any other obstruction that may interfere with lining operations. Immediately prior to installation of the lining the Contractor shall high pressure flush and vacuum every sewer section to be rehabilitated and repaired, including pertinent manholes.
- c) Condition of existing line shall be verified following cleaning by CCTV sewer inspection in accordance with the following:
- 1) Video shall be accompanied by a narrative written report detailing the findings on the video.

- 2) Video shall be obtained by use of a self-propelled pan and tilt color camera with the lens positioned centrally in the pipe.
- 3) The speed of the CCTV camera in the sewer shall be limited to 8 inches per second for surveys to enable all details to be extracted from the ultimate CD-ROM recording.
- 4) At the start of each manhole length a data generator shall electronically generate and clearly display on the viewing monitor and subsequently on the CD-ROM recording a record of data in alpha-numeric form containing the following minimum information:
  - a) Automatic update of the camera's footage position in the sewer line from adjusted zero
  - b) Sewer dimensions
  - c) Manhole/pipe length reference numbers
  - d) Date of inspection
  - e) Road name/location
  - f) Direction of inspection
  - g) Time of start of inspection
  - h) Sewer use (S-Sanitary Sewer, C-Combined Sewer, etc)
  - i) Material of construction of the pipe
- 5) The size and position of the data display shall be such as not to interfere with the main subject of the picture.
- 6) Once the survey of the pipeline is under way, the following minimum information shall be continually displayed:
  - a) Automatic update of the camera's footage position in the sewer line from adjusted zero (see Sub-clause A4)
  - b) Sewer dimensions in inches
  - c) Manhole or pipe length reference number (PLR). General convention allows upstream manhole number to be designated PLR
  - d) Direction of survey, i.e., downstream or upstream
- 7) CD-ROM capacity shall be adequate to record two hours of video inspection. Recording of a single segment shall not extend over more than one CD-ROM. No unrecorded gaps shall be left in the recording of a segment between surveys/inspections as the original video tape. Video shall be in .mpg format viewable on Windows Media Player.

- 8) Only segments between manholes on the same sewer reach or basin shall be included on one CD-ROM. There shall be no "split surveys" or "split-basins" between CD-ROMs.
  - 9) Each CD-ROM disc shall be labeled by reference to the header record for the survey section completed together with the following information:
    - a) Client Name: "City of Atlanta"
    - b) Project Name
    - c) Contractor's Name
    - d) Contractor's logo is optional
    - e) Survey date(s)
    - f) Survey Method: "CCTV – Internal Sewer Condition Assessment"
    - g) CD Volume Label – "XXXXXXYYZZTT", where:
      - i. XXXXXX is the Sewershed abbreviation, as provided by the City
      - ii. YY is the Company abbreviation, as provided by the City
      - iii. ZZ is the unique crew leader initials
      - iv. TT is a sequence number maintained for the crew leader
    - h) Video Filename(s): Alphanumeric using any convention. Filename is to be included in the header field as specified. Filename is limited to 5 characters (e.g. "00001" to "00004")
  - d) The accurate location and serviceability of all existing laterals and service connections (taps) shall be confirmed. Serviceability shall be confirmed by flowing water, dye testing or visually with CCTV sewer inspection.
  - e) The Contractor shall perform any necessary external point repairs to remove structural collapse, unacceptable liner deformation, blockages or to correct liner sags etc., as required by the Engineer.
- 05) GENERAL INSTALLATION PROCEDURES
- a) Resin Impregnation of the Flexible Tube
    - 1) The flexible tube shall be vacuum impregnated with resin under controlled conditions or, with the approval of the Engineer, by such other means compatible with the system employed that the contractor may elect in order to achieve comprehensive wet out. 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 sufficient to allow for the change in resin volume due to polymerization and to allow for any migration of resin into the cracks and joints in the original pipe due to pre-liner softening during the curing process.

- 2) Thoroughly saturate flexible tube prior to installation. Catalyst system or additives compatible with the resin and flexible tube shall be as recommended by the resin supplier and the CIPP liner manufacturer.
  - 3) Handle the resin impregnated flexible tube to retard or prevent resin setting until it is ready for insertion.
- b) Insertion of the Flexible Tube
- 1) The resin impregnated tube shall be inserted through an existing manhole or other access by means of an inversion process, drawing in place with a winch or by other approved method and the application of a hydrostatic or other pressure head. The pressure or force exerted shall be sufficient to fully extend the tube to the next designated manhole or termination point. The inversion head or other pressure head shall be sufficiently large to expand the flexible tube tightly to the pipe wall producing dimples at side connections. Care shall be taken during tube installation not to over-stretch or over-stress the fabric fiber. For winched in place liners a sliding foil shall be pre-installed prior to winching the liner tube in place in order to ensure that the liner tube is not overstressed or damaged during installation.
  - 2) A lubricant meeting the CIPP liner manufacturer's/resin supplier's recommendations, if any, shall be used. The lubricant shall be a nontoxic, oil-based product that has no detrimental effect on the tube, boiler or other heating system, pumps or other equipment used for the tube installation or curing process. The lubricant will not support the growth of bacteria and shall not adversely affect the existing conduit or the fluids to be transported by it.
- c) Curing
- 1) Unless instructed otherwise, the local repair installation shall be monitored by CCTV and resulting digital video presented to the Engineer. The video shall incorporate all other video footage of the rehabilitated pipeline.
  - 2) Where non-UV curing procedures are deployed following installation of the resin-impregnated flexible tube, a suitable heat source, i.e., steam or heated water, and appropriate equipment to ensure heat is uniformly distributed throughout the length of the pipe being lined shall be used. The heat source and circulation equipment shall be capable of raising the pressurized interior of the pipe uniformly to and above the temperature required to effect cure of the resin. The curing process, temperature and period of the process shall conform to the manufacturer's recommendations.

- 3) The non-UV curing procedures employed shall include the provision of temperature and pressure gages placed both at the upstream inlet and downstream outlet, as well as at intermediate access points, if any, to monitor temperatures and pressures during the cure period. Automatic log cure time-temperature data with a print out from the data logger shall be provided to the Engineer. Initial cure will occur during the temperature heat-up and is completed when exposed portions of the liner appear to be hard and sound and the temperature sensors indicate that the temperature is of a magnitude to realize an exothermic cure in the resin. After initial cure is reached, the temperature shall be raised to the post cure temperature and held for the period recommended by the resin manufacturer. 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).
  - 4) Where UV curing procedures are used the curing process, temperature and duration of the process shall strictly conform to the manufacturer's recommendations. Procedures employed shall include the provision of temperature and pressure gages placed both at the upstream inlet and downstream outlet, as well as at intermediate access points, if any, to monitor temperatures and pressures during the cure period. Automatic log cure time-UV intensity - temperature data with a print out from the data logger shall be provided to the Engineer on completion to confirm that the manufacturer's instructions have been fully complied with. 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).
  - 5) Cool down of the cured pipe liner shall be in accordance with the resin manufacturer's recommendations.
  - 6) The Contractor SHALL COMPLETE A PROCESS CONTROL SHEET FOR EACH AND EVERY LINING COMPLETED. The form of the process control sheet shall be as directed by the Engineer. Initial cure may be considered completed when exposed portions of the flexible tube pipe take a hard set and temperatures are adequate, as recommended by the manufacturer.
- d) Service Lateral Reconnection
- 1) All service laterals (including backdrops) shall be reconnected to the lined sewer within 24 hours following the lining process, unless otherwise allowed by the Engineer.
  - 2) The reconnection process shall be monitored by color pan, tilt and zoom CCTV cameras.

- 3) Lateral and service lines (including backdrops) shall be reconnected by either of the two methods following as directed by the Engineer:
    - a) Robotic Reconnection: The CIPP lining shall be cut insitu by a remotely controlled robotic cutter. The liner shall be cut out flush with the internal dimensions of the lateral or service connection, or
    - b) Sealing Tube Reconnection: A "Top Hat" type sealing tube or similar cured-in-place liner shall be with a minimum of eighteen inches (18") into the lateral or service connection from the mainline sewer. The lateral shall be cleaned and prepared for the installation in accordance with the manufacturer's recommendations. The resin-impregnated, flexible tube shall be inserted and cured by a device positioned in the mainline sewer pipe. The "top hat" shall create a continuous, watertight pipe-within-a-pipe to eliminate any visible infiltration and root growth at the lateral to mainline connection.
  - 4) Where in the Engineer's opinion the cut surfaces are ragged or in generally unacceptable condition the Engineer may require all cut surfaces to be treated and/or sealed with additional application of resin material or as otherwise directed. The Contractor is cautioned that all laterals that are connected into rehabilitated pipelines shall be designed and installed to ensure that groundwater is not permitted to enter the pipeline via the interface between the lining and the existing host pipe. Absence of controls to meet this requirement may result in the contractor rectifying the anomaly with other remedial measures to the satisfaction of the Engineer at the Contractors cost. Such remedial measure may as a minimum include the installation of a sealing tube.
    - e) The finished CIPP shall be continuous and free from visual defects such as foreign inclusions, dry spots, pinholes, delamination and wrinkles specified above. Any section of lining with such defects shall be removed and replaced at no additional cost to the City.
    - f) If in the course of the work, an existing service connection is not reintroduced through the liner the contractor must return to that location to reconnect the service. The reconnection shall be made at the unit price and there shall be no additional compensation for remobilization or set-up.
- 06) MANHOLE CONNECTIONS
- a) The installed CIPP liner shall make a tight seal with the host pipe at the manhole opening with no annular gaps that could allow infiltration into the manhole. In the event that a gap does occur between the CIPP liner and host pipe, the gap shall be sealed watertight by either of the following methods:

- 1) Apply a ¼” to ½” diameter activated Oakum band soaked in prepolymer urethane resin sealant (AV-219 by Avanti International or equal) circumferentially at the gap; or
  - 2) Use an approved epoxy mortar, resin mixture compatible with the CIPP liner, or similar material (subject to Engineer approval) to seal the gap. All materials for connection of the liner to the manhole must be as recommended and specifically approved by the CIPP liner manufacturer.
- b) Liners installed straight through existing manholes shall require the top half of the CIPP to be neatly cut off, at least four (4) inches away from the manhole walls. Breaking or shearing of the CIPP will not be allowed. The channel in the manhole shall be a smooth continuation of the pipe(s) and shall be merged with other lines or channels, if any. The channel cross-section shall be U-shaped with a minimum height of one-half pipe diameter (host pipe diameter smaller than 15 inches) to three-fourths of the pipe diameter (host pipe diameter 15 inches and larger). The side of the channels shall be built up with mortar/concrete to provide benches at a maximum 1 in 12 pitch towards the channel.
- c) Use an approved epoxy mortar, compatible resin or similar material to form a smooth transition to eliminate sharp edges of CIPP, within the host pipe and in manholes at the concrete bench, and channel invert. Build up and smooth invert of manhole to match flow line of new CIPP. All materials must be as recommended and specifically approved by the manufacturer of the liner.

#### 07) FIELD TESTING

- a) After the installation procedures have been performed and prior to reinstatement of service lateral connections, the Contractor shall perform a hydrostatic test in the presence of the Engineer on the sewer line to determine if it is watertight.
- b) The hydrostatic (exfiltration) test shall be performed using the existing hydrostatic head provided by the inversion standpipe. The test time shall be 5 minutes during which no makeup water shall be added to the standpipe. If at the end of the test period no water loss is observed in the standpipe, the watertightness of the cured-in-place pipe shall be considered satisfactory. All costs for the hydrostatic testing shall be considered incidental to the work and shall be included in the unit price per linear foot.
- c) For each length of line installed, two liner samples shall be required: A section of cured pipe cut from the terminal manhole and which has been inserted through a like diameter pipe held in place by a suitable heat sink (such as sandbags); and a factory produced sample fabricated from material taken from the tube and the resin/catalyst system used and cured in a clamped mold placed in the downtube. Each sample shall be large enough to provide a minimum of five (5) test specimens.

- d) Analyze samples according to ASTM D 790 and ASTM D 5813 and as directed by the Engineer. Analysis shall be performed by an independent laboratory approved by the City. Submit the report to the Engineer.
- e) A corresponding sample of local repair material from the testing above shall be subject to delamination tests by aggressively prying and separation into layers with a knife or sharp-edged instrument. No separation shall be possible. Results shall be included in the report above.
- f) Pipe failing to meet the requirements of paragraph 2.01 is subject to rejection and replacement at the contractor's expense.
- g) Testing and inspection, including taking of test specimens, testing of specimens, post installation television inspection, and watertightness testing are considered incidental to the CIPP work and shall be included in the unit price per linear foot.

08) POST-INSTALLATION CCTV INSPECTION

- a) Following completed installation of the CIPP liner, CCTV sewer inspection shall be carried out in accordance with the requirements of this specification. The post-installation CCTV inspection shall take place as shortly after completion of each section as is feasible, but in no case more than ten (10) calendar days thereafter. The finished video shall be continuous over the entire length of the sewer between two manholes and shall be completely free from visual defects. All costs associated with the post-installation CCTV sewer inspection shall be considered incidental to the CIPP work and shall be included in the unit price per linear foot.
- b) Submit to the Engineer a color digital video CD-ROM showing completed Work.
- c) Correction of failed CIPP or CIPP deemed defective from post-installation television inspection or test reports for structural values, thickness, etc., shall be repaired at no extra cost to the City. Method of repair, which may require field or workshop demonstration, shall be approved by the Engineer.
- d) An additional CCTV inspection shall be allowed for in the Contractor's unit price and work schedule, to be performed one year following the installation of a CIPP repair described above in Item C. Should any fault be found with the repair following the yearly inspection the fault shall be rectified as specified by the City. Rectification may include complete removal and renewal of the previously installed repair and re-inspection one year later. Correction of failed CIPP or CIPP deemed defective from mid-warranty internal condition inspection or test reports for structural values, thickness, etc., shall be repaired or replaced at no extra cost to the City. The CCTV inspection shall be performed in accordance with the requirements of this specification and shall be considered incidental to the CIPP work.

## 09) TYPE TESTING

- a) Type testing shall be carried out prior to the commencement of the Work and the results submitted by the CIPP liner manufacturer to confirm that the materials used comply with the specification. Tests shall be carried out by an independent third party laboratory body approved by the Engineer.
- b) The following tests shall be carried out and corresponding progress reports and results provided to the Engineer, on samples of cured resin/felt composite conforming to this specification:
  - 1) Tensile Strength
  - 2) Tensile modules of elasticity
  - 3) Flexural strength
  - 4) Flexural modules of elasticity
  - 5) Density
  - 6) Hardness (Barcol)
  - 7) Impact resistance
  - 8) Shear strength
  - 9) Abrasion resistance
  - 10) Coefficient of thermal expansion
  - 11) Compressive strength
  - 12) 100 day acid test
  - 13) Long term flexural creep test
- c) Details of standard test procedures shall conform to the relevant ASTM standard.
- d) Additional requirements are detailed below:
  - 1) Tensile Strength Testing: Test Methods in accordance with ASTM D 3039/ D 3039M where required samples shall be without end pieces. The rate of grip separation shall be 1 mm/minute. The tensile modules of elasticity shall be measured over the linear portion of the load extension curve. If the load extension curve contains no straight portion, the

modules shall be taken as the slope of the tangent to the curve over the first 0.2% strain ignoring the initial strain required to straighten the sample. Samples of single layer felt/resin or GRP/resin composite and multi-layer (2 or 3 layers of felt) composite shall be tested. The test report shall contain full particulars concerning the test and shall also include load extension curves for each sample.

- 2) Flexural Testing: Samples of single layer felt/resin composite and multi-layer (2 or 3 layers of felt) composite shall be tested. The modulus of elasticity shall be measured in accordance with Tensile Strength Testing above. The test report shall be measured in accordance with Tensile Strength Testing above. The test report shall contain all particulars in accordance with the relevant standard.
- 3) Density: Determine the hardness of single layer and multi-layer samples of cured resin/felt composite, or GRP/resin composite, in accordance with the relevant standard.
- 4) Hardness: Determine the hardness of single layer and multi-layer samples of cured resin/felt composite in accordance with the relevant standard.
- 5) Impact Resistance: The impact resistance of samples of multi-layer resin/felt composite shall be determined. A minimum of ten specimens shall be tested. The test report shall include all relevant particulars required by the relevant standard.
- 6) Shear Strength: Determine the shear strength of a cured single layer sample of resin/felt composite. The samples shall be tested with the axis of the punch perpendicular to the sheet from which the samples were machined. The test report shall contain all relevant particulars the relevant standard.
- 7) Abrasion Resistance: The abrasion resistance of the resin/felt composite shall be measured in accordance with ASTM D-1044 using a Tabor abrader with H-18 Calibrase wheels and 1 kilogram weights. The material shall be tested with the surface dry, and again with the surface wet. After 2000 cycles the depth of wear shall be measured and recorded.
- 8) Coefficient of Thermal Expansion: The coefficient of the thermal expansion of the resin/felt composite shall be measured in accordance with ASTM D-696 or VDE 0304. The method adopted shall be maintained for all tests performed throughout the Contract.
- 9) Compression Testing: Samples shall be Type 1, and the speed of testing shall be 1 mm/minute. The test report shall contain all particulars

required by the relevant standard.

- 10) 100 Day Acid Test: ASTM D 543 and ASTM D 3681 Samples of single layer and multi-layer or resin/felt composite shall also be subjected to a 100 day acid test. Samples shall be prepared to tensile and flexural testing as heretofore specified, and shall be immersed in 10% V/V sulfuric acid at 40° C for 100 days. After removal from the acid samples shall be washed, dried and tested for tensile and flexural properties. The values of the tensile and flexural strengths obtained from such tests shall not be less than 75.1% of the minimum values specified by the tests.
- 11) Long Term Flexural Creep Test: Where directed by the Engineer, the Contractor will be required to initiate, with an approved testing laboratory, tests to substantiate the value of the long term flexural modulus of the structural layer used in the design of the lining. The tests shall be continued for the duration of the contract, and results provided at maximum intervals of three months. Long Term Flexural Modulus shall be 125,000 psi.
  - a) All the above tests shall be carried out at 35°C ± 2°C (ambient sewer temperature).
  - b) In addition Tests (1) to (4), above, i.e. tensile and short term creep tests, shall be carried out in parallel from the same samples at 25°C ± 2° (ambient laboratory temperature) for correlation purposes. A report on the form of correlation shall be submitted to the Engineer's along with other test progress reports and results.
  - c) Properties of the cured composite Soft (Cured-in-Place) lining shall have the following minimum, values unless otherwise agreed by the Engineer:
    - 1) Flexural Strength  
4,500 psi (50 N/mm<sup>2</sup>)
    - 2) Flexural Modulus of Elasticity (short term)  
250,000 psi (2200 N/mm<sup>2</sup>)
    - 3) Wall Thickness  
(Design Thickness- inch)

**PART 4 – WARRANTY****01) MATERIAL WARRANTY**

- a) A written guarantee of five (5) years shall be provided by the Manufacturer against any breakdown of the material effectiveness of the structural repair elements.

**02) WORKMANSHIP WARRANTY**

- b) A written guarantee of two years minimum shall be provided by the Contractor against any shortcoming in workmanship.

**PART 5 – METHOD OF MEASUREMENT**

- a) The total length of completed and approved CIPP lining, for each original pipe diameter, shall be counted for payment. Pipe lengths shall be measured from center to center of manholes, with a 4 foot subtraction made at each intermediate manhole, and a 2 foot subtraction made at beginning or termination manholes.

**PART 6 – BASIS OF PAYMENT**

- a) Payment shall be made at the contract unit price for CIPP lining, for each of the pipe diameters required by the plans. This price shall be full compensation for liner installation, connection of the liner at the manholes, final cleaning, testing of liner samples, initial and final CCTV inspections.
- b) Payment will be made under:

Item D-752-1 – Cured In Place Pipe Lining, 18" Diameter – Per Linear Foot.

**END OF SECTION D-752**

# ATTACHMENT A

## PROCESS CONTROL SHEET - CIPP LINER (Following Mainline or Lateral Lining)

The Contractor shall complete a Process Control Sheet for each pipeline lined and shall submit a copy to the Engineer immediately following inspection of the lining installation. The Process Control Sheet shall include the information below as a minimum unless otherwise modified by the Engineer. In the event there are more than one inspector or contractor confirming the process completion per form, each section should be initiated by the performing inspector. All sections that were not completed due to lack of applicability to the rehab method used should have "N/A" entered.

**Date(s) Rehabilitation Carried Out:**

**Date Process Control Sheet Completed:**                                           

General Process Control Section		
- state whether process control sheet completed for <b>Mainline</b> , or <b>Lateral</b>		
<b>General</b>	WEATHER ETC: Prior to Lining (include air temperature)	
	During Lining (include air temperature)	
	Number of Cleanouts? Complete and inspected	
	Laterals Rehabbed? Type and Distance (ft) from Upstream MH	
	Lateral Connection(s):*	
	• Number (ea), Clock ref. from US MH	Total No.....
	• Sizes (in)	
	Confirm line CCTV'd and agreed lining viable <input type="checkbox"/> Yes <input type="checkbox"/> No	If no explain here:
Confirm line been cleaned and prepared for lining? <input type="checkbox"/> Yes <input type="checkbox"/> No	If no explain here:	
<b>Location</b>	Upstream Manhole ID <input type="checkbox"/> Entry <input type="checkbox"/> Reception	MH#
	Downstream Manhole ID <input type="checkbox"/> Entry <input type="checkbox"/> Reception	MH#
	Intermediate Manhole ID's	MH#
	Street Name(s)/Address	
<b>CIPP Installation</b>	INSTALLATION METHOD **	
	Inversion Start Time	
	Inversion Finish Time	
	Inversion Pressure (H <sub>w</sub> /psi)	
	CURING DETAILS:    • Start Time	
	• Temperature (°F)	
	• Time to Soak (minutes)	
• Curing Time	Start Time                      Finish Time	
• Cooling Time	Start Time                      Finish Time	
• Temperature at Release		
<b>By Pass /Reinstalle Flow</b>	By Pass Commenced (Date/Time)	
	Main Flow Reinstated (Date/Time)	
	Laterals Flow Reintroduced (Date/Time)	
<b>Temperature Monitoring</b>	THERMOCOUPLE:    • Type	
	• Temperature Range	
	• Entry Manhole	
	• Reception Manhole	
<b>Testing *</b>	Item A: Hydrostatic Test Complete? <input type="checkbox"/> Yes <input type="checkbox"/> No	
	Item B: Manhole Pipe Sample Complete? <input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>Signatures</b>	<b>Contractor</b>	<b>Inspector</b>
	By signing below, I agree that the above General Process Control section has been inspected and confirmed. I understand that I have the right to indicate, by my initials, which sections I am confirming if I have not completed all of the inspections myself. I am aware that all sections left blank will be considered incomplete and may be sent back with request for additional information.	By signing below, I agree that the above General Process Control section has been inspected and confirmed. I understand that I have the right to indicate, by my initials, which sections I am confirming if I have not completed all of the inspections myself. I am aware that all sections left blank will be considered incomplete and may be sent back with request for additional information.
	Type Name Here	Type Name Here
	Signature X	Signature X

\* Testing Note: All samples removed for testing shall be individually labeled and logged to record the following: (1) Owner's project number and title (2) Sample number (3) Line Segment (4) Date and Time of Sample (5) Contractor Name (6) Date, location and by whom tested (7) Results of test

\*\* Please indicate which method was used: e.g., Tower (T), CHIP unit (CHIP), or Winched-in-Place (WIP)

Contractor Specific Process Control Section	
Material Composition Details	SOFT LINING:
	• Internal Diameter (in)
	• Design Thickness (mm)
	• Diameter Ratio (DR)
	• Felt (details)
	• Resin (details)
	• Internal Skin (name)
	Pre-Liner (details)
	Wet Out Length (lf)
	Final Length (lf)
	RESIN:
	• Batch Number
• Weight (lbs)	
• Accelerator (name)	
• Additives (name)	
• Catalyzer (name)	
Wet - Out	MIXING DETAILS:
	• Date / Time
	• Temperature (°F)
	IMPREGNATION DETAILS:
	• Start Date and Time
	• Finish Date and Time
	BAG CHILLING DETAILS:
	• Date / Time
• Temperature (°F)	
Dispatch Date and Time	
Arrival Date and Time	
Testing*	Date Submitted for Testing
	Test Results Target Date
Signatures	<b>Contractor</b>
	I agree that the above Contractor Specific Process Control Section is complete and accurate to the best of my knowledge. I understand that all sections that are left blank will be considered incomplete sections and may be sent back for additional information. Type Name Here  Signature X

\* Testing Note: All samples removed for testing shall be individually labeled and logged to record the following: (1) Owner's project number and title (2) Sample number (3) Line Segment (4) Date and Time of Sample (5) Contractor Name (6) Date, location and by whom tested (7) Results of test

\*\* Please indicate which method was used: e.g., Tower (T), CHIP unit (CHIP), or Winched-in-Place (WIP)

**ATTACHMENT B**

**Company Logo and Contact Information**

Test Report (CIPP)

<b>Client:</b> Address Line 1 Address Line 2 City, State, Zip	<b>Product Type:</b> Felt CIPP
<b>Attention:</b> Contact Person	<b>Manufacturer:</b>
<b>Report Date:</b> MM/DD/YYYY	<b>Sample Location:</b> US/DS/INTERMEDIATE MH #
<b>Report Number:</b> 12345	<b>Sample ID:</b> A123456
<b>Project Name:</b> SG1PH1CIPPA - FC00000	<b>Design Thickness:</b> 6.0 mm
<b>Contractor:</b> CIPP Contractor	<b>Design Thickness:</b> 0.236 inches
<b>USMH St Address:</b> 230 Peachtree Street NE	<b>Installation Date:</b> MM/DD/YYYY
<b>Pipe ID:</b> 12345678901T98765432101	<b>Tested By:</b> John Smith
	<b>Diameter:</b> 8 inches
	<b>Pipe Length:</b> 123 Feet

**Flexural Properties (ASTM D 790)**

**Crosshead Speed:** 0.089 in/min      **Date of Test:** MM/DD/YYYY  
**Procedure:** A

Specimen ID	Depth (IN)	Width (IN)	Length (IN)	Span (IN)	Flexural Yield Strength (PSI)	Modulus of Elasticity (PSI)
S1						
S2						
S3						
S4						
S5						
Mean:					#DIV/0!	#DIV/0!
Std Deviation:					#DIV/0!	#DIV/0!
Reason for rejection:						

**Liner Thickness (ASTM D 5813)**

Measurement Position	0°	45°	90°	135°	180°	225°	270°	315°
Measured Thickness (mm)	5.998	6.011	6.011	6.123	6.089	6.122	6.235	6.333
Minimum Thickness	6.0 mm							
Average Thickness	6.115 mm							
Avg ≥ Min Thickness:	<b>YES</b>							

Signed: \_\_\_\_\_  
Registered Professional Engineer

## SECTION D- 753 SLIPLINING METHOD

### PART 1 – GENERAL

#### 01) SCOPE

- a) ***This specification shall cover the rehabilitation of existing force mains, gravity sanitary sewers and sewer service laterals. All work shall be performed only as directed by the Engineer or shown on the Construction Drawings.***
- b) Sliplining is defined as the trenchless reconstruction of existing wastewater mains by subsequently inserting pipe lengths, which are joined into a continuous tube, within the bore of the existing pipe and grouting the annular spacing between the new pipe and the existing pipe.
- c) The scope includes standards for dimensionality, testing, quality, acceptable fusion practice, safe handling, storage and installation of the pipe by sliplining.
- d) The scope of work requires the Contractor to provide all materials, labor, equipment, and services necessary for bypass pumping and/or diversion of sewage flows, rehabilitation of existing sanitary sewers by sliplining the existing pipe and inserting a new pipe, reconnection of active sewer service connections (service laterals), anchoring new pipe, restoring affected manholes, cleaning, CCTV inspection and final testing of the new pipe system.
- e) The sewer sliplining work details include:
  - 1) Site Planning and Preparation:
    - a) Perform site investigation and record all pre-existing conditions of all structures within the immediate area, landscaping and/ or roadways prior to construction.
    - b) Perform initial CCTV inspection of sewer to be replaced (See specification D-752). Locate all active sewer service connections (laterals) and sags or blockages.
    - c) Formulate and execute plans for sag/blockage repairs, launching pipe excavation, layout for sewer bypass pumping

- d) system, marking existing utilities, service laterals, cleanout, etc.

2) Pipe Installation:

- a) Excavate launching and receiving pits.
- b) Install sewer bypass pumping system.
- c) Excavate to relieve effects to existing utilities.
- d) Excavate to expose all active service connections (laterals).
- e) If directed to do so by the Engineer, provide bypass pump to extract flow from high-volume service connections (laterals).
- f) If directed to do so by the Engineer, temporarily disconnect/plug active service connections (laterals).
- g) Install new sewer pipeline by sliplining methods.
- h) Install new manholes where required by the Engineer.
- i) Anchor pipe and seal manholes.
- j) If directed to do so by the Engineer, replace existing active service connections (laterals) from new or existing cleanouts and lamp holes to new sewer pipeline.
- k) Perform CCTV inspection of all active service laterals and remedy those determined to be defective.
- l) Reconnect all active service connections (laterals) to new sewer pipeline.
- m) Connect replacement pipeline to existing manholes.
- n) Perform post-installation cleaning and CCTV sewer inspection for quality control.
- o) Remove sewage bypass pumping system(s).
- p) Backfill and restore excavations.
- q) Perform pipeline testing.

- 3) Cleanup and restore existing surface condition and structures.
- 4) Repair defective work per Engineer's final inspection.
- f) The Contractor is responsible for proper and accurate installation of the new sewer pipe regardless of the method described in this section and the following subsections. The Contractor shall ensure that the new pipe's vertical and horizontal alignment is as indicated on the plans and/or as existing in the field in accordance with these specifications.
- g) Supplying all labor, materials, equipment and apparatus not specifically mentioned herewith or noted on the plans, but which are incidental and necessary to complete the Work specified.

## 02) QUALIFICATIONS

- a) The Contractor shall be certified by the sliplining system manufacturer as a fully trained and/or licensed user of the sliplining system. Operation of the system shall be performed by trained personnel. Such training shall be conducted by a qualified representative of the system manufacturer.
- b) All sliplining operations shall be performed by a qualified sliplining company who has at least five (5) years' experience involving work of a similar nature. The company must have installed a minimum of 10,000 linear feet of pipe (6-inch diameter or greater) using sliplining and supply a list of project references, prior to job commencement.
- c) Fusible Polyvinylchloride pipe and 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 of the fusion equipment manufacturer.
- d) Contractor shall hold the City and Engineer harmless in any legal action resulting from patent infringements.

## 03) STANDARD SPECIFICATIONS

- a) Except as otherwise indicated, the current editions of the following apply to the Work of this Section:
  - 1) ASTM C 923                      Standard Specification for Resilient Connectors

Between Reinforced Concrete Manhole Structures,  
Pipes, and Laterals

- 2) ASTM D 1599 Test for Short Term Rupture Strength of Plastic Pipe, Tubing and Fittings
- 3) ASTM D 1784 Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
- 4) ASTM D 1928 Preparation of Compression Molded Test Polyethylene Samples
- 5) ASTM D 2122 Determining Dimensions of Thermoplastic Pipe and Fittings
- 6) ASTM D 2152 Test Method for Degree of Fusion of Extruded Poly(Vinyl Chloride) (PVC) Pipe and Molded Fittings by Acetone Immersion
- 7) ASTM D 2321 Underground Installation of Thermoplastic Flexible Sewer Pipe
- 8) ASTM D 2412 Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel Plate Loading
- 9) ASTM D 2657 Practice for Heat-Joining Polyolefin Pipe and Fittings
- 10)ASTM D 3034 Specification for PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- 11)ASTM D 3035 Specification for Polyethylene (PE) Plastic Pipe (SDR\_DR) Based on Controlled Outside Diameter
- 12)ASTM D 3261 Specification for Polyethylene Plastic Pipe and Fittings Material
- 13)ASTM D 3262 Specification for Glass-Fiber Reinforced Thermosetting-Resin Sewer Pipe
- 14)ASTM D 3550 Standard Practice for Ring Lined Barrel Sampling of Soils

- |                |   |
|----------------|---|
| 15)ASTM D 4161 | Specification for Glass-Fiber Reinforced Thermosetting Resin Pipe Joints Using Elastomeric Seals                          |
| 16)ASTM D 3681 | Standard Test Method for Chemical Resistance of Fiberglass Pipe in a Deflected Condition                                  |
| 17)ASTM F 477  | Elastomeric Gaskets (Seals) for Joining Plastic Pipe  |
| 18)ASTM F 679  | Standard Specification for Poly(Vinyl Chloride) (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings              |
| 19)ASTM F 714  | Specification for Polyethylene (PE Plastic Pipe (SDR_PR) Based on Outside Diameter (3" and larger)                        |
| 20)ASTM F 1057 | Standard Practice for Estimating the Quality of Extruded Poly (Vinyl Chloride) (PVC) Pipe by the Heat Reversion Technique |
| 21)ASTM F 1417 | Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air                    |
| 22.AWS D1.1    | AWS Standard Qualification Procedure  |

#### 04) SUBMITTALS

- a) The following shall be submitted to the City in writing prior to or at the time indicated in accordance with General Condition Section 28. Failure to do so will prevent progression of the Work to the next stage:
- 1) Manufacturer's technical literature on the proposed sliplining systems (At Pre-Construction Meeting)
  - 2) Written certification from the sliplining system provider that the Contractor or Subcontractor is a trained and licensed installer (At Pre-Construction Meeting)
  - 3) Shop drawings, catalog data, and manufacturer's technical data showing complete information on material composition, physical properties, and dimensions of new pipe and fittings (At Pre-

- Construction Meeting).
- 4) Include manufacturer's recommendations for handling, storage, time for re-connection of laterals, joint welding and repair of pipe and fittings damaged (At Pre-Construction Meeting).
  - 5) The Contractor shall prepare and submit, for the Engineer's approval, a general methodology/Work Plan of the sliplining, including materials and equipment, lateral numeration and manhole restoration procedure and materials, by-pass pumping system accommodation and maintenance of intermediate flows and connections, plan of operation, construction and restoration of existing sewer service connections (At Pre-Construction Meeting).
    - a) Work plan shall include for each sliplining installation all excavation locations, interfering utilities, excavation dimensions, bypass pumping and traffic control schematics.
    - b) At least 2 weeks prior to the start of work, the Contractor shall submit its sliplining schedule identifying daily work hours and working dates for each installation.
    - c) Grout design mixes, installation plan, and contingency plan for the annular space grout to be used, if grout is to be used for annular space fill.
  - 6) Certification of workers trained for welding and/or installing pipe (At Pre-Construction Meeting).
  - 7) A detailed methodology for each set up during the course of the contract, but not less than ten days before sliplining is planned to commence. This detailed methodology shall be agreed upon between the contractor and the Engineer. (Before Sliplining)
  - 8) Sliplining Push-Pull Method: Submittals shall include shop drawings and calculation of columnar strength of the pipe. The drawings shall show dimensions of pipes including inside diameter and wall thickness, details of pipe joints and gaskets showing cushion packing ring (if required) and laying length of each pipe wall thickness, dimensionality, pressure Class or pipe stiffness per applicable standard and as shown on plans, color, recommended Minimum Bending Radius, recommended Maximum Safe Pull Force. (Before Sliplining)
  - 9) Pre and post installation CCTV inspection reports and videos. Post installation reports and videos shall be made after pipe installation and re-connection of all laterals and immediately prior to the

commissioning stage (Pre and Post Installation Stage).

- 10) Methodology for dealing with any possible ground heave shall be fully detailed both in relation to:
    - a) Restoration of Landscape areas-restoration of ground contours and surface treatment to meet the reasonable requirements of the property owner, and
    - b) Structures: Pre-installation of monitoring devices where the adverse effect of sliplining could worsen existing structural defects in buildings and/or other structures. (At Pre-Construction Meeting)
  - 11) Manhole invert rebuilding method and materials (Before Sliplining)
  - 12) A written verification at least 2 days before commencing sliplining that the sewer is free of obstructions and debris and is in suitable condition for sliplining. (Before Sliplining)
  - 13) Drawings and design calculations demonstrating adequacy of any proposed temporary work including excavation, locations, sheeting and shoring, method of dewatering, other utilities that may be affected; width and length of working area access pit and portions of existing sewer to be removed to conduct the Work. (Before Sliplining)
  - 14) Process Control Sheet to include equipment tensile or compressive load information, excavation reinstatement, and tap cut information and pre and post submittal follow up record/survey inspection report, alignment inspection where sliplining are complete. (After Completion of Each Section)
  - 15) HDPE Repair Methods [If required] (Before Repairs Are Made)
  - 16) Sag/Blockage Repair Methods [If required] (Before Repairs Are Made)
- 05) TRIAL TEST AND METHODOLOGY REVIEW
- a) The Contractor shall comply with the following conditions before a pipe sliplining technique becomes accepted as a viable option on a repeat basis:
    - 1) A successful demonstration for a trial length of sewer pipeline, chosen by the Engineer, which requires sliplining, shall be carried

out including type and quality control tests as recommended by the manufacturer and in compliance with industry standards.

- 2) The Contractor shall include and allow for representation by the equipment manufacturer if requested and further requirement of the Engineer, subsequent to the trial, to modify the equipment, material and/or installation methodology in order to complete the Work satisfactorily and meet all testing standards at no cost to the City.
- 3) The Engineer shall formally accept the Contractor as having successfully completed the trial stage should this be the case.

## PART 2 – PRODUCTS

### 01) MATERIALS

Unless otherwise specified in the plans and/or specifications, the following pipes or approved equal can be considered for sliplining contingent upon approval by the Owner:

- a) Fusible Polyvinylchloride (PVC) pipe
  - 1) The pipe supplied under this specification shall be high performance fusible polyvinylchloride (PVC) pipe.
  - 2) Product shall be and manufactured under the trade name Fusible C-900, C-905, and FPVC. manufactured by Underground Solutions, Inc. or approved equal.
  - 3) All piping shall be made from a PVC compound conforming to cell classification 12454 per ASTM D1784.
  - 4) All pipes shall have a minimum pipe stiffness of 46 psi at five percent deflection as determined by ASTM D 2412.
  - 5) Fusible PVC pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe
  - 6) Fusible PVC gravity sewer pipe shall be supplied in a standard 40

foot nominal lengths or custom length as specified by the Engineer.

- 7) Fusible PVC pipe shall be green in color for wastewater use.
- a) High Density Polyethylene Plastic Pipe
- 1) Pipe shall be high-density solid wall polyethylene pipe (HDPE) in accordance with specifications in Section D-750.
  - 2) Sizes of the insertions to be used shall be as indicated or specified to renew the sewer to greater flow capacity.
  - 3) 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.
  - 4) 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.
  - 5) Dimension Ratios: The minimum wall thickness of the polyethylene pipe shall be SDR 17 throughout.
  - 6) Material color shall be light gray. Light gray interior color of pipe shall allow easier/better viewing for television inspection.
  - 7) Product shall be equal to Driscoplex, manufactured by Chevron Phillips.
- b) Centrifugally Cast Fiberglass Reinforced Plastic (GRP) Pipe
- 1) Product shall be and manufactured by Hobas, Inc. or approved equal and shall be manufactured and tested in accordance with ASTM D3262
  - 2) Minimum pipe stiffness when tested in accordance with ASTM D2412 shall normally be 36 psi (may range from 18 psi to 46 psi and sometimes higher).
  - 3) Sizes of the insertions to be used shall be as indicated or specified to renew the sewer to greater flow capacity. The actual outside diameter (18" to 48") of the pipe barrel shall be in accordance with ASTM D3262. For other diameters, OD's shall be per manufacturer's literature.

- 4) 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.
  - 5) 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.
  - 6) Pipe shall be supplied in nominal lengths of 20 feet. When required by radius curves, pit size, sewer irregularities, etc., pipe shall be supplied in nominal lengths of 10 feet or other even divisions of 20 feet. Actual laying length shall be nominal +1, -4 inches. At least 90% of the total footage of each size and class of pipe, excluding special order lengths, shall be furnished in nominal length sections.
- c) Grout for use as a filler of the annular space between the liner pipe and the host pipe shall be a low-density, highly flowable mix.
- 1) Grout shall meet the compressive strength requirements for the installation per the contract documents.
  - 2) Testing requirements shall be in accordance with the contract documents. Contractor may incorporate grout additives to improve its flow properties, provided that strength property requirements are met.
- d) Fusion Joints
- 1) Unless otherwise specified, fusible polyvinylchloride pipe lengths shall be assembled in the field with butt-fused joints. The fusion technician shall follow the pipe supplier's guidelines for this procedure. All fusion joints shall be completed as described in this specification

## 02) MATERIAL TESTS

- a) A certificate shall be furnished by the manufacturer for all material furnished under this specification. Pipe and fittings may be rejected that do not meet any requirements of this specification.
- b) Upon request by the Engineer, the Contractor shall furnish samples for material tests by the City's independent laboratory demonstrating compliance with Specification Section D-750 for PVC and HDPE pipe and fittings to verify the required physical properties and characteristics of

supplied materials. The City shall pay for tests on pipe samples that meet specification requirements. Contractor shall pay for failed tests and re-testing of failed materials.

### PART 3 – EXECUTION

#### 01) EXISTING UTILITIES AND OBSTRUCTIONS

- a) ***Refer to Specification D-750, Subsection 05, Basis of Payment, Section a, Subsection 6.***

#### 02) SEWER SERVICE CONNECTIONS

- a) ***Refer to Specification D-750, Subsection 05, Basis of Payment, Section a, Subsection 1.***

#### 03) DELIVERY, STORAGE, AND HANDLING

- a) Transportation, handling, and storage of the pipe and fittings shall be as recommended by the manufacturer to prevent damage.
- b) If new pipe and fittings become damaged before or during installation, it shall be repaired as recommended by the manufacturers or replaced as required by the Engineer at the Contractor expense, before proceeding further.
- c) All pipes shall be bundled or packaged in such a manner as to provide adequate protection of the ends during transportation to the site. Any pipe damaged in shipment shall be replaced as directed by the owner or Engineer.
- d) Each pipe shipment should be inspected prior to unloading to see if the load has shifted or otherwise been damaged. Notify owner or engineer immediately if more than immaterial damage is found. Each pipe shipment should be checked for quantity and proper pipe size, color, and type.
- e) Handling of Pipe: Pipe shall be stored on clean, level ground to prevent undue scratching or gouging of the pipe. If the pipe must be stacked for storage, such stacking should be in accordance with the pipe manufacturer's recommendations. The pipe should be handled in such manner that it is not damaged by being dragged over sharp objects or cut by chokers or lifting equipment.

- 1) Pipe should be loaded, off-loaded, and otherwise handled in

accordance with AWWA M23, and all of the pipe supplier's guidelines shall be followed.

- 2) Off-loading devices such as chains, wire rope, chokers, or other pipe handling implements that may scratch, nick, cut, or gouge the pipe are strictly prohibited.
  - 3) During removal and handling, be sure that the pipe does not strike anything. Significant impact could cause damage, particularly during cold weather.
  - 4) If appropriate unloading equipment is not available, pipe may be unloaded by removing individual pieces. Care should be taken to insure that pipe is not dropped or damaged. Pipe should be carefully lowered, not dropped, from trucks.
- f) Repair of Damaged Sections: Segments of pipe having cuts or gouges in excess of 10% of the wall thickness of the pipe shall be cut out and removed. The undamaged portions of the pipe shall be rejoined using the butt fusion joining method.
- g) Pipe Joining: Sections of polyvinylchloride pipe and polyethylene pipe should be joined into continuous lengths on the job site above ground. The joining method shall be performed in strict accordance with the pipe manufacturer's recommendations. The butt fusion equipment used in the joining procedure shall be capable of meeting all conditions recommended by the pipe temperature, alignment, and fusion pressure.
- h) Handling of Fused Pipe: Fused segments of pipe shall be handled so as to avoid damage to the pipe. When lining fused sections of pipe, chains or cable-type chokers should be avoided. Nylon slings are preferred. Care should be exercised to avoid cutting or gouging the pipe.
- 04) EXISTING FLOW
- a) The Contractor shall provide bypass pumping as detailed in Specification Section D-756 – Wastewater Flow Control.
  - b) The Contractor shall be responsible for maintaining continuous sanitary sewer service to each property connected to the segment of sewer subject to pipe sliplining operations.
  - c) If sewage backup occurs and enters buildings, the Contractor shall be responsible for clean-up, disinfection, repair, property damage, as well as resultant costs and claims.

**05) PRE-INSTALLATION CCTV INSPECTION**

Pipelines that will be upgraded by sliplining and shall be televised (CCTV) in conformance with the City of Atlanta Specification for Internal Sewer Condition Assessment for CCTV sewer inspection. (Section D-754)

CCTV inspection conditions shall include the following:

- 1) Preconstruction video CDs shall be available for viewing by the Engineer before construction begins and throughout the project.
- 2) Video CDs shall remain property of the City. Contractor shall retain second copy for internal use.
- 3) All flows tributary to reach of sewer being inspected are to be completely by-passed around the reach during preconstruction inspection if necessary and required by the City.
- 4) If any portion of the inspection video is of inadequate quality or coverage, as determined by the City, the Contractor will have the portion re-inspected at no additional expense to the City.

**06) PRE-INSTALLATION CLEANING**

- a) Host pipe shall be cleaned in accordance with all applicable standards and guidelines. Unless otherwise specified, all interior pipe surfaces shall be cleaned per AWWA M28.
- b) Hazardous materials shall be removed and disposed of per all applicable regulations.
- c) All pipelines shall be cleaned with as many passes as necessary to create a uniform interior host pipe surface free of all loose material and sharp edges. Any potentially deleterious areas of the host pipe should be removed or secured in place, prior to the insertion of the new pipe.

**07) CORRECTION OF PIPE SAG OR BLOCKAGE**

- a) Significant sags in the sewer pipe or a blockage must be corrected prior to renewing the sewer pipe by sliplining. Correction will be accomplished by point repair as directed by the Engineer.

**08) CONSTRUCTION METHOD**

- a) DELETED.

- b) The Contractor shall install all pulleys, rollers, bumpers, alignment control devices and other equipment required to protect existing manholes, and to protect the new 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 (polyvinylchloride and polyethylene) or compressive or tensile limit (vitrified clay and ductile iron).
- c) Trenching and Backfill: All trenching and backfill shall be in accordance with Section 02200 and standard details on the Drawings and as indicated below:
- 1) Trench Construction: The trench and trench bottom should be constructed in accordance with ASTM D 2321 – Section 7.
  - 2) Embedment Material: Embedment materials should be Class I, Class II, or Class III materials as defined in ASTM D 2321 – Section 6. The use of Class IV and/or Class V materials for embedment is not recommended and should be allowed only with the approval of the engineer.
  - 3) Bedding: Bedding of the pipe should be performed in accordance with ASTM D 2321 –Section 8. Compaction should be specified in ASTM D 2321. Deviation from the specified compaction shall be approved by the engineer.
  - 4) Haunching and Initial Backfill: Haunching and initial backfill should be as specified in ASTM D 2321- Section 9 using Class I, Class II, or Class III materials. Materials used and compaction shall be as specified by the engineer. Compaction 85% Standard Proctor Density must be maintained in unpaved areas. Paved areas will require a higher level of compaction in accordance with the pavement design criteria.
  - 5) Special Conditions: ASTM D 2321 – Section 11.2, Minimum Cover for Load Application, Section 11.3, Use of Compaction Equipment and Section 11.4, Removal of Trench Protection, should apply unless directed otherwise by the engineer.
- d) Excavation and Access Pits
- 1) Access pit length shall be such that the minimum bending radius for the replacement pipe, per the pipe supplier is maintained. Sheeting, shoring and bracing requirements shall be in accordance

with these specifications and applicable jurisdictional standards.

- 2) Access pit excavations shall be performed at all points where replacement pipe will be inserted into the existing pipeline. When possible, access pit excavations shall coincide with host pipe lateral connection points or other appurtenance installations.
- e) Pulling Equipment
- 1) The pulling mechanism shall be properly connected to the end of the new pipe via a pulling head or arrangement approved by the pipe supplier.
  - 2) The maximum pulling tension on the new pipe shall not exceed the pipe supplier's safe pulling force as submitted for this project.
  - 3) Immediately following the completion of an installation by sliplining, if possible, the pipe should be pushed back into the location of the insertion, at the pulling head, until a small amount of movement is realized at the insertion pit on the other side of the installation from the pulling equipment.

#### 09) ANNULAR SPACE GROUTING

- a) The annular space between the outside of the replacement pipe and the inside of the existing host pipe shall be filled with a flowable grout in accordance with the contract documents.
- b) Samples of grout shall be obtained in accordance with ASTM C495. One set of four standard cylinders shall be cast for each batch. Special handling and sampling procedures shall be followed if indicated by the grout manufacturer. The samples must meet the design compressive strength of the grout as outlined in this specification and per the grout manufacturer. Samples shall be tested in accordance with ASTM C495.
- c) Grouting of the annular space shall be done in such a manner as to prevent damage, floating, or collapse of the replacement pipe. Grouting operations shall be properly vented. If the distance between grout points exceeds the Contractor's pumping capability additional grouting points shall be excavated. The replacement pipe shall not be grouted above the springline of the existing host pipe at access pits, service connections, and grouting points.
- d) The replacement pipe shall be filled with water prior to the grouting procedure. This shall aid in keeping the replacement pipe from floating or collapsing during grouting operation and also aid in dissipating the heat of hydration and its effects on the new pipe as the grout cures.

## 10) POST-INSTALLATION CCTV INSPECTION

- a) All costs associated with the post-installation CCTV inspection shall be considered incidental to the sliplining work.
- b) Following the installation of the new pipelines, CCTV inspection shall be performed in accordance with the requirements of the City of Atlanta Specification of Internal Sewer Condition Assessment (Section D-754 in these Specifications). The finished video shall be continuous over the entire length of the sewer between two manholes and shall be completely free from visual defects.
- c) Defects, which may affect the integrity or strength of the pipe in the opinion of the Engineer, shall be repaired or the pipe replaced at the Contractor's expense.
- d) Video shall remain property of the City. Contractor shall retain second copy for internal use.
- e) Post construction video shall be available to view within one month after the project is completed. Post construction video and a CD-ROM conversion of the documented videos shall be submitted to the City before final invoices, reduction of retainage or release of any retainage withheld.
- d) If any portion of the inspection tapes is of inadequate quality or coverage, as determined by the City, the Contractor will have the portion re-inspected and video taped at no additional expense to the City.

## 11) FUSIBLE POLYVINYLCHLORIDE PIPE JOINING

- a) Fusible polyvinylchloride pipe will be handled in a safe and non-destructive manner before, during, and after the fusion process and in accordance with this specification and pipe supplier's guidelines.
- b) Fusible polyvinylchloride pipe will be fused by qualified fusion technicians holding current qualification credentials for the pipe size being fused, as documented by the pipe supplier.
- c) Pipe supplier's procedures shall be followed at all times during fusion operations.
- d) Each fusion joint shall be recorded and logged by an approved electronic monitoring device (data logger) connected to the fusion machine, which

utilizes a current version of the pipe supplier's recommended and compatible software.

- e) Only appropriately sized and outfitted fusion machines that have been approved by the pipe supplier shall be used for the fusion process. This includes requirements for safety, maintenance, and operation with modifications made for PVC.

## 12) HDPE 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 who are 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 rollback 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 Engineer's representative prior to insertion. All defective joints shall be cut out and replaced at no cost to the City. 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 or greater than that of the pipe being joined.

## 13) INFILTRATION AND EXFILTRATION TESTING

- a) Pipelines rehabilitated and replaced shall be tested for watertightness in accordance with Specification Section D-750. This applies to ductile iron and HDPE replacement pipe. All inlets to the system shall be effectively closed and any residual flow shall be deemed to be infiltration.
  - b) Notwithstanding the satisfactory completion of the above test for pipelines, if there is any discernible flow of water entering rehabilitated pipelines or manholes, at a point that can be located by visual or CCTV inspection, the Contractor shall take such additional measures required by the Engineer to stop infiltration at the Contractor's expense.
  - c) All costs associated with the watertightness test and foregoing requirements shall be considered incidental to the work and shall be included in the unit price.
- 14) POST INSTALLATION DEFLECTION
- a) All polyethylene pipe installed by sliplining shall be subjected to a visual deflection check to determine if ovality greater than 10% exists by observation of the post installation CCTV inspection.
  - b) The deflection test shall be performed by the Contractor in the presence of the Engineer. All costs associated with the deflection test and foregoing requirements shall be considered incidental to the sliplining work and shall be included in the unit price for sliplining.

#### PART 4 – WARRANTY

##### 01) MATERIAL WARRANTY

- a) A written guarantee of 5 years, submitted to the City for the specific project, shall be provided by the Manufacturer against any breakdown of the polyethylene or fiberglass reinforced polymer mortar pipe material effectiveness.

##### 02) WORKMANSHIP WARRANTY

- a) A written guarantee of 2 years minimum shall be provided by the Contractor against any shortcoming in Workmanship.

#### PART 5 - MEASUREMENT AND PAYMENT

**01) METHOD OF MEASUREMENT**

- a) The total length of completed and approved HDPE Sliplining shall be counted for payment. Pipe lengths shall be measured from center to center of manholes, with a 4 foot subtraction made at each intermediate manhole and a 2 foot subtraction made at beginning or termination manholes.

**02) BASIS OF PAYMENT**

- a) Payment shall be made at the contract unit price of HDPE sliplining for each of the pipe diameters required by the plans. This price shall be full compensation for liner installation, annular grouting, connection of the liner at the manholes, cleaning, testing of liner, initial and final CCTV inspections.
- b) Payment will be made under:

Item D-753-1 – Sliplining, 18” HDPE – Per Linear Foot

**END OF SECTION D-753**