

**Request for Construction Change  
Change Order No. 2**

City of Franklin  
Engineering Office  
109 Third Avenue South  
Franklin, TN 37064

Contract No. 2017-0131  
Project 54" Southeast Interceptor Sewer  
Emergency Repair

Whereas, we **GARNEY COMPANIES INC.** entered into a contract with the CITY OF FRANKLIN, on June 21, 2017, for the construction by said Contractor of the above designated contract; and Whereas, certain items of construction encountered are not covered by the original contract, we desire to submit the following additional items of construction to be performed by the Contractor and paid by the City at the prices scheduled therefore below:

**Reason for Change Order:**

- Change the item description on Line Item S-5 to clearly indicate how fuel usage shall be reimbursed for the operation of the bypass pumps. The WMD project manager and WMD's onsite representative will verify fuel usage and costs prior to invoice approval by the Director.

**Attachments (List documents supporting change):**

- N/A

**Original contract line item:**

Item	Item Description	Qty	Unit	Unit Price	Total
S-5	Fuel Costs <b>Allowance</b> for Bypass Pumping, Invoice Reimbursement (Gallons used@ \$/Gallon purchased)	1	LS	\$95,000.00	\$95,000.00

**Change to read:**

Item	Item Description	Qty	Unit	Unit Price	Total
S-5	Fuel used based on Engine Hours, Average RPM, and Average \$/gallon price (with appropriate supporting calculations and sample fuel delivery invoices)	1	LS	\$95,000.00	\$95,000.00

**Change Order No. 1 line item:**

Item	Item Description	Qty	Unit	Unit Price	Total
S-5	Fuel Costs <b>Allowance</b> for Bypass Pumping, Invoice Reimbursement (Gallons used@ \$/Gallon purchased)	1	LS	\$10,000.00	\$10,000.00

**Change to read:**

Item	Item Description	Qty	Unit	Unit Price	Total
S-5	Fuel used based on Engine Hours, Average RPM, and Average \$/gallon price (with appropriate supporting calculations and sample fuel delivery invoices)	1	LS	\$10,000.00	\$10,000.00

<b>CHANGE IN CONTRACT PRICE:</b>
Original Contract Price <u>\$1,322,930.00</u>
Net Increase ( <del>Decrease</del> ) from previous Change Orders No. 0 to 1: <u>\$1,174,390.00</u>
Contract Price prior to this Change Order: <u>\$2,497,320.00</u>
Net <del>increase</del> ( <del>decrease</del> ) of this Change Order: \$0
Contract Price with all approved Change Orders: <u>\$2,497,320.00</u>

<b>CHANGE IN CONTRACT TIMES:</b>
Original Contract Times: Substantial Completion: N/A Ready for final payment: N/A
Net change from previous Change Orders No. 0 to _ to: Substantial Completion: N/A Ready for final payment: N/A
Contract Times prior to this Change Order: Substantial Completion: N/A Ready for final payment: N/A
Net increase (decrease) this Change Order: Substantial Completion: N/A Ready for final payment: N/A
Contract Times with all approved Change Orders: Substantial Completion: N/A Ready for final payment: N/A

Now, Therefore, We, **GARNEY COMPANIES INC.** Contractors, hereby agree to this Supplemental Agreement consisting of the above mentioned items and prices, and agree that this Supplemental Agreement is hereby made a part of the original contract and will be performed by this Contractor in accordance with specifications thereof, and that the original contract remain in full force and effect, except in so far as specifically modified by this supplemental Agreement.

**RECOMMENDED FOR APPROVAL BY:**

By: <u>Michael On HAZEN</u> Engineer Date: <u>8/16/2017</u>	By: <u>Patricia McNeese</u> Project Manager Date: <u>8/17/17</u>
By: <u>Melvin Hatcher</u> Water Management Director Date: <u>8/21/17</u>	

**ACCEPTED:**

By: <u>[Signature]</u> Contractor (Authorized Signature) Date: <u>08/17/2017</u>
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**APPROVED:**

By: <u>Eric S. Stuckey</u> Owner (Authorized Signature) Date: <u>8/31/17</u>
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**APPROVED AS TO FORM:**

By: <u>Kristen L. Corn</u> Kristen L. Corn, Assistant City Attorney Date: <u>08-16-17</u>
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**Request for Construction  
Change Order No. 3**

City of Franklin  
Engineering Office  
109 Third Avenue South  
Franklin, TN 37064

Contract No. 2017-0131  
Project 54" Southeast Interceptor Sewer  
Emergency Repair

Whereas, we **GARNEY COMPANIES INC.** entered into a contract with the CITY OF FRANKLIN, on June 21, 2017, for the construction by said Contractor of the above designated contract; and Whereas, certain items of construction encountered are not covered by the original contract, we desire to submit the following additional items of construction to be performed by the Contractor and paid by the City at the prices scheduled therefore below:

**Reason for Change Order:**

- Repair 330 linear feet of 54-inch HOBAS pipe that is cracked above the WWTP using Cured-in-Place (CIP) piping.

**Attachments (List documents supporting change):**

- Letter from Michael Orr with Hazen and Sawyer dated July 27, 2017

**Add the following items to the existing contract:**

Item	Item Description	Qty	Unit	Unit Price	Total
S-1	54-inch Cured-in-Place Pipe, 33.0/42.00 mm	330	LF	\$956	\$315,480
S-2	Remove and Re-install MH cone section	2	EA	\$2,500	\$5,000
S-3	Clean of 54" host pipe to be lined, Waste material shall be disposed of offsite at On-Site Environmental	1	LS	\$7,875	\$7,875
S-4	Extend existing bypass pumping discharge piping to a MH downstream of CIPP launch MH	1,000	LF	\$70	\$70,000
S-5	Replace MH frame and Cover, "Water Tight"	2	EA	\$600	\$1,200
S-10	Seasonal Seeding (with Mulch) on all disturbed areas	1	AC	\$2,000	\$2,000
S-11	Silt Fence, along alignment and spoil area	500	LF	\$5	\$2,500
S-12	CIPP 3 <sup>rd</sup> Party Material Testing	1	EA	\$395	\$395
S-13	CCTV Inspection, post installation prior to service	330	LF	\$10	\$3,300
S-16	Final Cleanup and Surface Restoration	1	LS	\$5,000	\$5,000
				Total	\$412,750

CHANGE IN CONTRACT PRICE:
Original Contract Price
<u>\$1,322,930.00</u>
Net Increase (Decrease) from previous Change Orders
No. 0 to 1: <u>\$1,174,390.00</u>
Contract Price prior to this Change Order:
<u>\$2,497,320.00</u>
Net increase (decrease) of this Change Order:
<u>\$412,750.00</u>
Contract Price with all approved Change Orders:
<u>\$2,910,070.00</u>

CHANGE IN CONTRACT TIMES:
Original Contract Times:
Substantial Completion: N/A
Ready for final payment: N/A
Net change from previous Change Orders No. 0 to _ to:
Substantial Completion: N/A
Ready for final payment: N/A
Contract Times prior to this Change Order:
Substantial Completion: N/A
Ready for final payment: N/A
Net increase (decrease) this Change Order:
Substantial Completion: N/A
Ready for final payment: N/A
Contract Times with all approved Change Orders:
Substantial Completion: N/A
Ready for final payment: N/A

Now, Therefore, We, **GARNEY COMPANIES INC.** Contractors, hereby agree to this Supplemental Agreement consisting of the above mentioned items and prices, and agree that this Supplemental Agreement is hereby made a part of the original contract and will be performed by this Contractor in accordance with specifications thereof, and that the original contract remain in full force and effect, except in so far as specifically modified by this supplemental Agreement.

**RECOMMENDED FOR APPROVAL BY:**

By: Michael On **HAZEN**  
Design Engineer

Date: 9/14/17

By: Patricia McNeese  
City Project Manager

Date: 9/18/17

By: Heather Harker  
Water Management Director

Date: 9/18/17

**ACCEPTED:**

By: [Signature]  
Contractor (Authorized Signature)

Date: 09/18/2017

**APPROVED:**

By: [Signature]  
Owner (Authorized Signature)

Date: 9-25-2017

**APPROVED AS TO FORM:**

By: [Signature]  
Tiffani M. Pope , Staff Attorney

Date: 9/22/17





*Emergency Sewer Repair*

July 27, 2017

**Re: Request for Emergency Quote: 54" Southeast Interceptor Sewer Emergency Repair  
Repair-6: Approx. 330 LF of Cleaning and CIPP between SMH11510-17051**

**To: Mr. Jeff Seal, Zack Bloomfield - Garney Construction**

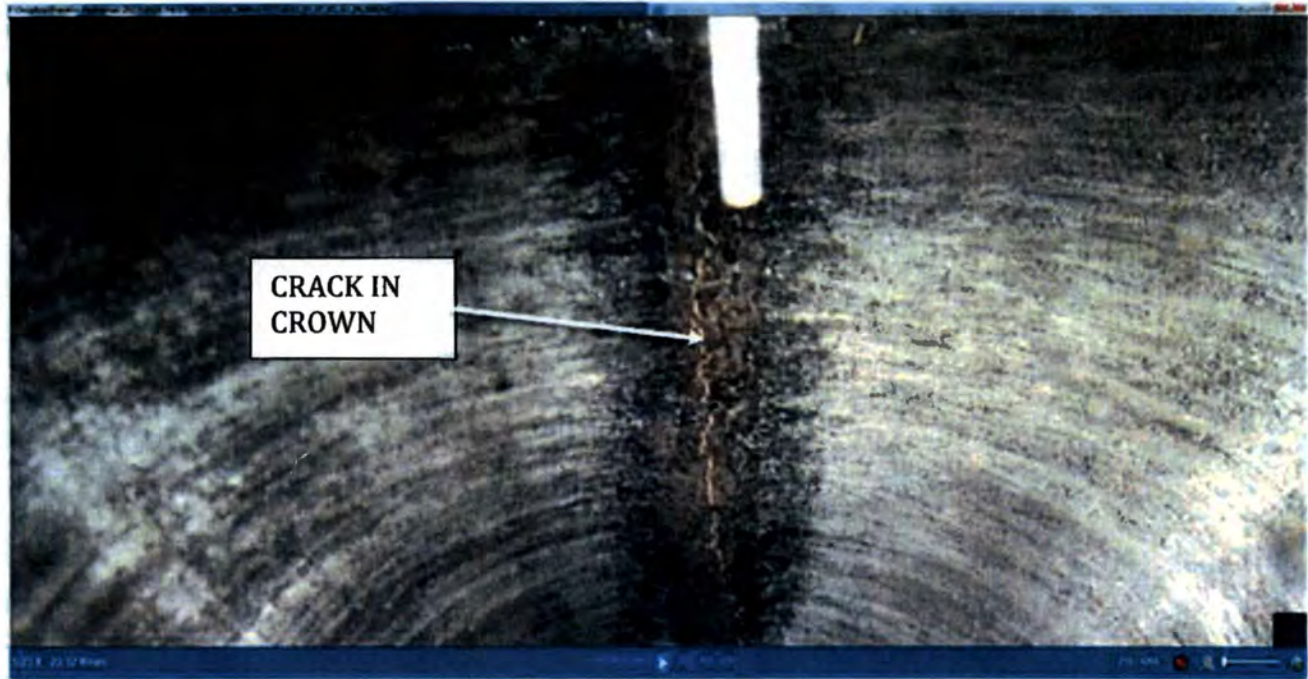
**From: Michael L. Orr, PE – Hazen and Sawyer on behalf of the City of Franklin**

### **Background**

During the recent Multi-Sensor Inspection of the 54" gravity sewer upstream of the WWTP a crack was discovered in the crown of one of the pipe joints. This crack was not visible during the 2015 CCTV investigation. Once a crack is visible the pipe has lost its structural integrity and requires repair or replacement. The pipe no longer has the ability to support the earth load above it.



Job no



## PIPE CROWN

### **Notes: Repair/Replacement -6**

1. Photo taken from MSI beginning downstream SMH-17051 facing upstream direction toward SMH-11510,
2. A crack was visually identified at approximately the 12 o'clock position of the pipe
3. Pipe must be cleaned and lined or replaced to provide the City with reliable long term service.

The City has compared the costs of cleaning and lining the pipe with replacing the pipe between the two manholes. The City believes it's in the best interest for the health and safety of Franklin's residents to line the cracked pipe by installing a Cured-In-Place (CIP) pipe inside the existing 54" diameter HOBAS pipe for it's entire length, manhole to manhole.





## Scope of Emergency Response

“MH to MH CIP Pipe”

- Approximately 330 LF between SMH-11510 and SMH-17051 (GIS),

## Contractor Scope of Work

The Contractor shall furnish all labor and materials required to perform all operations for the cleaning and CIPP installation in the 54” sanitary sewer and incidental tasks necessary to complete the work as described below.

1. Repair-6: As represented in the attached GIS base maps, the Contractor shall clean and install a Cured-In-Place Pipe inside the existing 54” pipe from SMH-11510 to SMH-17051. Per 2001 asbuilt drawings, MH A-4 Sta 11+31.00 up to MH A-5 Sta 14+64.8.
2. Provide engineering design calculations, in accordance with the Appendix of ASTM F-1216 for each length of liner to be installed including the thickness of proposed CIPP.
3. Install and maintain perimeter erosion prevention and sediment controls.
4. Continue control, responsibility, invoicing, and operation of the bypass pumping system as provided by Xylem for the duration of the project.
5. Relocate the current bypass pumping discharge from SMH-18054 to SMH-11508.
6. Relocate the 54” plug from SMH-18055 to SMH-11509.
7. Replace the existing MH Frames and Covers with new Watertight versions and securely attach them to the existing MHs with M-1 Structural Adhesive/Sealant or equivalent.
8. CIPP shall be pressure tested prior to acceptance.


9. Prior to acceptance, post CCTV shall be submitted to the Owner/Engineer for review.
10. Disturbed area shall receive finish grading, areas that received heavy construction traffic shall be scarified to a 4inch depth.
11. All disturbed areas shall receive seasonal seeding and mulch.
12. Complete CIPP during bypass pumping period of previously approved pipe replacement between SMH-11110 and SMH-10332.

## Bid Form

Item	Item Description	Qty	Unit	Unit Price	Total
S-1	54-inch Cured-in-Place Pipe, <u>33.0/42.0</u> mm	330	LF	\$956	\$315,480.00
S-2	Remove and Re-install MH cone section	2	EA	\$2,500	\$5,000.00
S-3	Clean of 54" host pipe to be lined, Waste material shall be disposed of offsite at On-Site Environmental	1	LS	\$7,875	\$7,875.00
S-4	Extend existing bypass pumping discharge piping to a MH downstream of CIPP launch MH	1,000	LF	\$70	\$70,000.00
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				<b>Total</b>	<b>\$412,750.00</b>

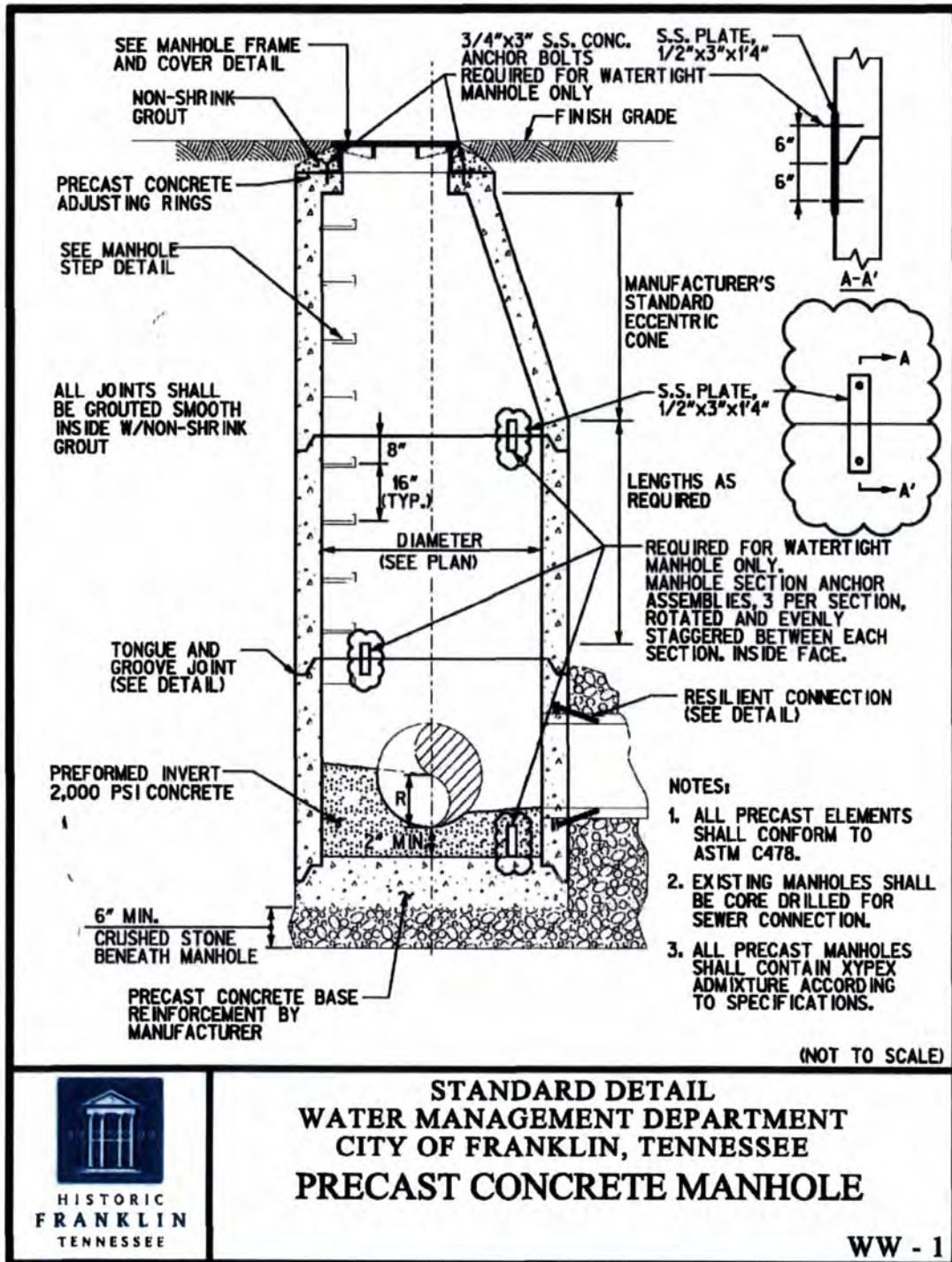
## CONTRACTOR CLARIFICATIONS, ASSUMPTIONS, AND OMISSIONS

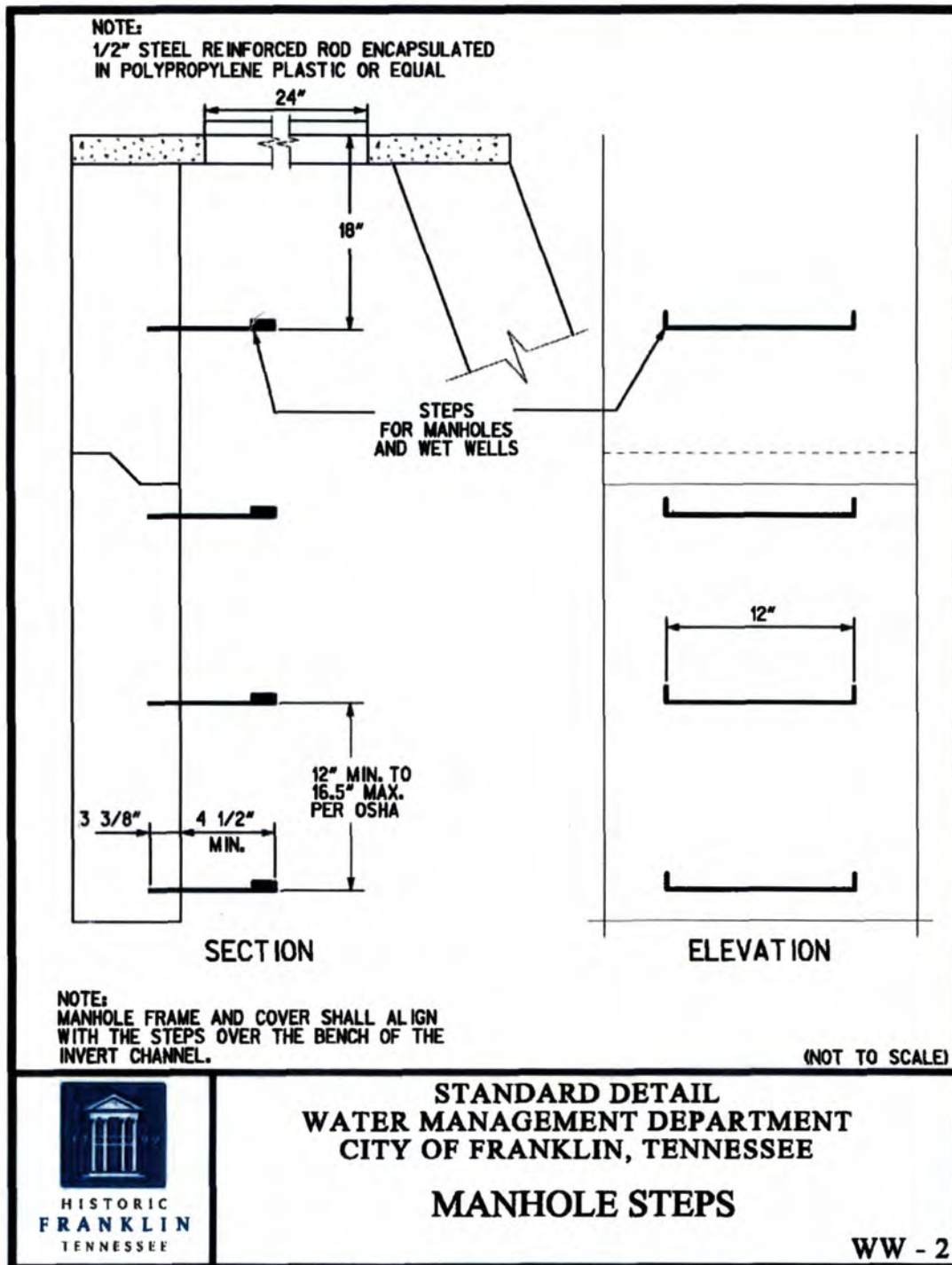
-Pricing is based on one mobilization to the site.
-Payment and Performance Bond included.
-Additional bypass management will not be required if approval to order the CIPP liner is received prior to August 17th. It is anticipated to take two weeks to receive the liner once ordered.
-CIPP liner thickness of 42.0 MM of the last 30 linear feet of the downstream section of this pipe segment. The remaining approximate 300 linear feet will be a minimum of 33.0 MM. This is based on an ovality of 8% in the pipe section in questions and 2% for the remainder of the pipe. We feel this is accurate based on our inspection and the photographs that have been provided.
-VeriCure System will be utilized for temperature monitoring during CIPP installation.

  
Submitted by

8-15-17  
Date



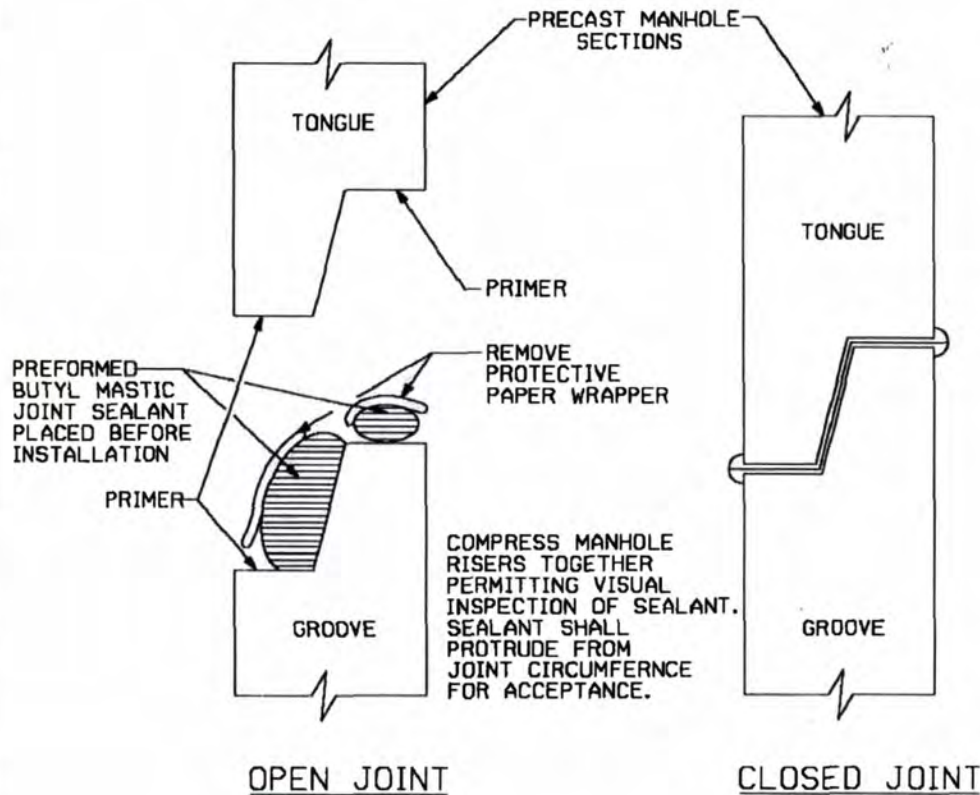






**NOTE:**

WHERE MASTIC DOES NOT PROTRUDE, EITHER INSIDE OR OUTSIDE, INJECT JOINT WITH CONSEAL CS-231, CONTROLLED EXPANSION WATERSTOP, OR APPROVED EQUIVALENT.



(NOT TO SCALE)



**STANDARD DETAIL  
WATER MANAGEMENT DEPARTMENT  
CITY OF FRANKLIN, TENNESSEE  
BUTYL MASTIC GASKET FOR  
PRECAST MANHOLE SECTIONS**

**G - 11**

## SECTION 02765

### CIPP – GRAVITY LINES

#### PART 1 -- GENERAL

##### 1.01 SCOPE OF WORK

- A. It is the intent of this specification to provide for the reconstruction of pipelines by the installation of a resin impregnated flexible tube which is formed to the host conduit and cured to produce a continuous and tight fitting Cured-In-Place Pipe (CIPP). CIPP shall be designed for gravity wastewater application.
- B. The Contractor shall furnish all labor, materials, accessories, equipment and tools necessary to install and test CIPP lining as specified herein. These services include, but are not limited to, controlling infiltration, cleaning and television inspection of the sewers to be lined, liner installation, quality controls, providing samples for performance testing, and warranty.
- C. The work requires lining to and from manholes, vaults, and a pump station. These are all considered access points, but may be identified only as manholes in the specification below. The Contractor shall determine the appropriate staging and sequencing to accomplish this work.

##### 1.02 RELATED WORK

- A. Specification 02766 – Hydrophilic End Seals
- B. Specification 02767 – Chemical Grouting

##### 1.03 SUBMITTALS

- A. The Contractor shall submit design calculations, design data and specification data sheets listing all parameters used in the CIPP design and thickness calculations based on ASTM F1216. All CIPP liner design calculations shall be sealed and signed by a registered Professional Engineer in Tennessee. Submit P.E. certification form for all CIPP design data.
- B. Submit detailed installation plan and schedule. This plan shall include, but is not limited to, required preparation work, pre-CCTV inspections, shipping and storage requirements, liner curing procedures including method and heat-up/cool-down rates, minimum and maximum allowable pressures and speeds, curing temperature and duration, final CCTV inspection, and testing procedures. The plan shall be certified by the resin and CIPP manufacturers.
- C. Product data on fabric tube, fiberglass laminate, end seal, flexible membrane, and resin.
- D. Provide chemical safety data sheets
- E. Various test results as specified herein under paragraph Section 3, including, but not limited to:
  - 1. Pre- and Post- CCTV inspections

2. Wetout and Cure reports
3. Temperature logs
4. Sample test results

#### 1.04 REFERENCE STANDARDS

##### A. American Society for Testing and Materials (ASTM)

1. ASTM D543 – Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents
2. ASTM D638 – Test Methods for Tensile Properties of Plastics.
3. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
4. ASTM D2412- Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
5. ASTM D2990 – Standard Test Methods for Tensile, Compressive and Flexural Creep and Creep Rupture of Plastics.
6. ASTM D5813 – Standard Specifications for Cured-in-Place Thermosetting Resin Sewer Piping Systems.
7. ASTM F1216 - Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube.

- B. Where reference is made to one of the above standards, the revision in effect at this time of shall apply.

#### 1.05 QUALITY CONTROL

- A. The Contractor performing the CIPP lining work shall be fully qualified, experienced and equipped to complete this work expeditiously and in a satisfactory manner and shall be certified and/or licensed as an installer by the CIPP manufacturer. Only commercially proven products and installers with substantial track records will be approved.
- B. The Engineer or Owner shall approve or disapprove the Contractor and/or manufacturer based on the submitted information and a follow up interview, if warranted. Contractor will provide additional information as requested.
- C. Inspection of the liner may be made by the representative of the Owner after delivery. The liner shall be subject to rejection at any time on account of failure to meet any of the requirements specified, even though sample liner may have been accepted as satisfactory at the place of manufacture. Liner rejected after delivery shall be marked for identification and shall be removed from the job site at once.

#### 1.06 GUARANTEE



- a. All CIPP lining placed shall be guaranteed by the Contractor and manufacturer for a period of one (1) year from the date of final acceptance. During this period, defects discovered which affect the integrity or strength of the pipe shall be repaired in a manner mutually agreed upon by the Owner and Contractor at no cost to the Owner. The Owner may conduct an independent television inspection, at his own expense, of the lining work prior to the completion of the one year guarantee period.
- b. Any repair work completed by the Contractor to replace a defective or failed lining shall be warranted for an additional one (1) year from the date of acceptance of repaired work.

#### 1.07 DELIVERY, STORAGE AND HANDLING

- A. Care shall be taken in shipping, handling and storage to avoid damaging the liner. Extra care shall be taken during cold weather construction. The liner shall be accompanied by test reports certifying that the material conforms to the ASTM standards listed herein.
- B. Any liner damaged in shipment shall be replaced as directed by the Inspector. Damages include, but are not limited to, splits or tears, gouging, abrasions, flattening, ultra-violet (UV) degradation, and puncturing. Liners which have received damage shall be marked as rejected and removed at once from the job site.
- C. The liner shall be maintained at a proper temperature in refrigerated facilities to prevent premature curing at all times prior to installation. The liner shall be protected from UV light prior to installation. Any liner showing evidence of premature curing will be rejected for use and will be removed from the site immediately.

### PART 2 – PRODUCTS

#### 2.01 CIPP LINING

- A. The liner shall be composed of tubing material consisting of one or more layers of flexible non-woven polyester with or without additives such as woven fiberglass or other fibers. The felt tubing shall be impregnated with a thermosetting polyester resin and catalyst, vinyl ester and catalyst or epoxy resin and hardener. The liner material and resin shall be completely compatible. The outside layer of the tube (before wetout) shall be coated with an impermeable, flexible membrane that will contain the resin and facilitate monitoring of resin saturation during the resin impregnation (wetout) procedure.
- B. The tube shall be constructed to withstand installation pressures, have sufficient strength to bridge breaks and missing sections of the existing pipe, and stretch to fit irregular pipe sections. The new jointless pipe within a pipe must fit tightly against the old pipe wall and consolidate all disconnected sections into a single continuous conduit, eliminating infiltration or exfiltration.
- C. All dimensions shall be field verified by the Contractor by CCTV video observation and direct measurement of pipes prior to ordering the liner to ensure adequate sizing requirements for each individual pipe segment. The tube shall be sewn to a size that when installed will tightly fit the internal circumference and length of the host pipe with minimal shrinkage, in such a way as to minimize water migration (tracking) between the liner and the host pipe. Allowance should be made for circumferential stretching during inversion, and longitudinal stretching during pull in. Overlapped layers of felt in longitudinal seams that cause lumps in the final product shall not be utilized. The tube shall be marked for distance at regular



intervals along its entire length, not to exceed 5 feet. Such marking shall include the Manufacturer's name or identifying symbol. The tubes shall be manufactured in the USA.

- D. The wetout tube shall have a uniform thickness that when compressed at installation pressures will meet or exceed the Design thickness. The tube shall be homogeneous across the entire wall thickness containing no intermediate or encapsulated elastomeric layers. No material shall be included in the tube that may cause delamination in the cured CIPP. No dry or unsaturated layers shall be evident. The liner shall be able to cure in the presence of water at a temperature of 180 degrees F or less.
- E. The wall color of the interior pipe surface of CIPP after installation shall be a relatively light reflective color so that a clear detailed examination with closed circuit television inspection equipment may be made.
- F. The resin system shall be a corrosion resistant polyester, vinyl ester, or epoxy and catalyst system that when properly cured within the tube composite meets the chemical resistance requirements of ASTM F1216 and D543. Resins created from recycled material is not allowed.
- G. The finished pipe in place shall be fabricated from materials which when cured will be chemically resistant to withstand internal exposure to domestic sewage. All constituent materials will be suitable for service in the environment intended. The final product will not deteriorate, corrode or lose structural strength that will reduce the projected product life. In industrial areas a liner system using epoxy vinyl ester resin shall be utilized and a polyester resin shall be used in non-industrial areas.
- H. The length of the liner shall be the length deemed necessary by the Contractor to effectively carry out the insertion of the liner and sealing of the liner at the outlet and inlet manholes. The required length of liner shall be verified in the field by the Contractor prior to fabrication and preparation for installation.
- I. All CIPP liners shall be provided with hydrophilic end seals, as specified in Specification 02766, installed at both ends of each section of pipe.
- J. The CIPP shall be designed in accordance with the applicable provisions of ASTM F1216 and D2412 for "fully deteriorated gravity pipe conditions" and shall assume no bonding to the host pipe wall. The structural performance of the finished pipe must be adequate to accommodate all anticipated loads throughout its design life, which shall meet the following design conditions:
  - 1. Have a minimum design life of fifty (50) years.
  - 2. A soil modulus of elasticity of between 700 psi and 1200 psi shall be used. A soil weight of 120 pounds per cubic foot and a coefficient of friction of  $K_u=0.130r$  shall be used for the installed depths.
  - 3. The long-term flexural modulus used in the design calculations shall be estimated by multiplying the short-term flexural modulus specified in the ASTM standards by a reduction factor of 0.50.
  - 4. Safety factor of 2.0 shall be used.

5. Groundwater levels shall be estimated to be halfway between top of pipe and lowest ground surface along the pipe.
6. Depth of soil shall be above crown of pipe to surface.
7. Service temperature range shall be 40 to 140 degrees F.
8. Maximum long term deflection shall be 5 percent.
9. The liner shall be watertight.
10. The existing pipe conditions shall be reflected in the design of the liner thickness. In particular, the ovality of the existing pipe and, thus, the liner pipe shall be accurately estimated and reflected in the design calculations.
11. The thickness to be used for the liner shall be the largest thickness as determined by calculations for deflection, bending, buckling, and minimum stiffness.
12. The cured liner shall have the following minimum structural properties:

Property	Test Method	Minimum Standard
Flexural Strength	ASTM D790	4,500 psi
Flexural Modulus	ASTM D790	250,000 psi

### PART 3 – EXECUTION

#### 3.01 INSTALLATION

- A. Each length of pipe to be lined shall be cleaned prior to liner installation, with material to be disposed of in a manner approved by the Owner.
- B. In the presence of the Engineer, the Contractor shall conduct a television inspection and physical measurement of each length of pipe, Contractor shall conduct a CCTV inspection immediately prior to inserting the liner to confirm that conditions are acceptable for lining. Contractor shall obtain Engineer approval of the acceptability of the existing pipe condition prior to installation of CIPP.
- C. Active infiltration shall be stopped using chemical grout per Specification 02767 prior to installation of CIPP.
- D. The Contractor shall immediately notify the Owner of any construction delays taking place during the insertion operation. Such delays shall possibly require sampling and testing by an independent laboratory of portions of the cured liner at the Owner's discretion. The cost of such test shall be borne by the Contractor and no extra compensation will be allowed. Any failure of sample tests or a lack of immediate notification of delay shall be automatic cause for rejection of that part of the work at the Owner's discretion.
- E. The materials and processes must be reasonably available for pre installation, installation and post installation inspections. Areas which require inspection include, but are not limited to, the following:



1. Product materials should exhibit sufficient transparency to visually verify the quality of resin impregnation.
  2. Temperature sensing devices, such as thermocouples, shall be located between the existing pipe and the CIPP to ensure the quality of the cure of the wall laminate.
- H. The Contractor shall submit "wet out" and "cure" reports documenting the specific details of the liner's vacuum impregnation and saturation with resin and the CIPP installation of the liner. A copy of all "wet out" and "cure" records shall be submitted to the Owner prior to request for payment. If the "wet out" and "cure" reports are not presented prior to a payment request, payment for the work will not be made and the request will be rejected. At a minimum, this report shall include, in addition to Contractor and Contract identification:
1. Line identification and location
  2. Wet-out date
  3. Sample identification(s) and technician
  4. Installation (in sewer) date
  5. Host sewer pipe inside diameter
  6. Liner thickness
  7. Liner length
  8. Liner and resin batch numbers
  9. Resin type
  10. Wet out length
  11. Roller spacing
  12. Vacuum setting
  13. Quantity of resin and catalyst utilized
  14. Wet out technicians
  15. Time wet out started and completed
  16. Applicable remarks
  17. (Heat cure) Boiler and liner heating fluid pressure and temperature versus time log during cure period
- I. Resin Impregnation: The quantity of resin used for tube impregnation shall be sufficient to fill the volume of air voids in the tube with additional allowances for polymerization shrinkage and the loss of resin through cracks and irregularities in the host pipe wall. A vacuum

impregnation, resin bath, or approved equal process shall be used. To insure thorough resin saturation throughout the length of the felt tube, the point of vacuum shall be no further than 25 feet from the point of initial resin introduction. After vacuum in the tube is established, a vacuum point shall be no further than 75 feet from the leading edge of the resin. The leading edge of the resin slug shall be as near to perpendicular as possible. A roller system shall be used to uniformly distribute the resin throughout the tube. If the Installer uses an alternate method of resin impregnation, the method must produce the same results. Any alternate resin impregnation method must be proven.

- J. Tube Insertion: The wetout tube shall be positioned in the pipeline using either inversion or a pull in method. If pulled into place, a power winch should be utilized and care should be exercised not to damage the tube as a result of pull in friction. The tube should be pulled in or inverted through an existing access point and fully extend to the next designated manhole or termination point.
- K. Temperature gauges shall be placed inside the tube at the invert level of each end, or throughout its length, to monitor the temperatures during the cure cycle.
- L. Curing shall be accomplished by utilizing the appropriate medium in accordance with the manufacturer's recommended cure schedule. The curing source or in and output temperatures shall be monitored and logged during the cure cycles if applicable. The manufacturer's water cure method and schedule shall be used for each line segment installed, and the liner wall thickness and the existing ground conditions with regard to temperature, moisture level, and thermal conductivity of soil, per ASTM as applicable, shall be taken into account by the Contractor.
- M. Initial cure shall be deemed complete when the exposed portions of the tube appear to be hard and sound and the temperature sensor indicates that the temperature is of a magnitude to realize exothermic reaction. The cure period shall be of a duration recommended by the resin manufacturer and may require continuous recirculation of the water to maintain the temperature. The Contractor shall have on hand at all times, for use by his personnel and the Owner, a digital thermometer or other means of accurately and quickly checking the temperature of exposed portions of the liner.
- N. Cool down: The Contractor shall cool the hardened pipe to a temperature below 100 degrees F before relieving the hydrostatic head. Cool down may be accomplished by the introduction of cool water into the inversion standpipe to replace water being pumped out of the manhole. Care should be taken in release of static head so that vacuum will not be developed that could damage the newly installed liner.
- O. Finish: The new pipe shall be cut off in the manhole at a suitable location. All CIPP liners shall be provided with hydrophilic end seals, as specified in Specification 02766, installed at both the manhole interfaces. End seals shall be installed per manufacturer's instructions. The finished product shall be continuous over the length of pipe reconstructed and be free from dry spots, delamination and lifts. Pipe entries and exits shall be smooth, free of irregularities, and watertight. No visible leaks shall be present and the Contractor shall be responsible for grouting to remove leaks or fill voids between the host pipe and the liner. During the warranty period, any defects which will affect the integrity or strength of the product shall be repaired at the Contractor's expense, in a manner mutually agreed upon by the Owner and the Contractor.



- P. Testing of samples shall be the responsibility of the Contractor. A plate sample shall be prepared. The test sample shall be fabricated from the material taken from the liner and cured in a clamped mold with the resin used in the liner construction placed in the down tube. Representative specimens from all installed liners are to be tested by an independent, ASTM certified laboratory. All test samples shall be clearly identified with the location, date of installation, and project name. The extraction and labeling of test specimens shall be done in the presence of the Owner. The Owner and Contractor shall, upon completion of sample extraction and labeling, both sign a chain-of-custody form that shall subsequently accompany the sample at all times and shall ultimately be received and signed at the testing laboratory. Test reports shall include a copy of the chain-of-custody form with all signatures to ensure that reported test results are for the correct sample.

Each sample shall be large enough to provide at least five total specimens for testing of thickness and for flexural properties per the following standards and procedures:

Thickness	ASTM D5813
Initial Flexural Strength	ASTM D790 Procedure A

All samples shall be prepared in accordance with ASTM F1216.

Results of the tests for each liner shall be mailed directly to the Owner within 30 days after the liner is installed.

### 3.02 REPAIR AND REPLACEMENT

- A. The Contractor shall outline specific repair or replacement procedures for potential defects that may occur in the installed CIPP. Repair and/or replacement procedures shall be as recommended by the CIPP system manufacturer.
- B. Defects in the installed CIPP that will not affect the operation and long term life of the product shall be identified, defined, and submitted to the Owner for review and acceptance.
- C. Repairable defects shall be clearly defined and presented to the Owner by the Contractor along with a detailed step-by-step repair procedure, based on manufacturer's recommendations, resulting in a finished product meeting the requirements specified herein.
- D. Unrepairable defects shall be clearly defined and presented to the Owner by the Contractor, including a recommended procedure for the removal and replacement of the CIPP, based on the manufacturer's recommendations.

### 3.03 FIELD TESTING AND PRELIMINARY ACCEPTANCE

- A. The finished liner shall be continuous over the entire length of the installation. The liner shall be free from visual defects, damage, deflection, holes, delamination, uncured resin, etc. No pinholes, cracks, thin spots, dry spots, or other defects in the liner will be permitted. There shall be no visible infiltration through the liner or from behind the liner at manholes and service connections.
- B. Following installation of the liner, the Contractor shall conduct a final digitally recorded color television inspection of the completed work. Copies of these post-installation digital recordings, as well as the digital recordings made prior to the liner installation shall be

submitted to the Engineer for approval and shall be retained by the Engineer. Payment will not be made for any CIPP lining until the Engineer has reviewed and approved these digital recordings. The Contractor shall submit the CD or DVD disks a minimum of two weeks in advance of any payment request to provide the Engineer ample time to review the recordings.

- C. There shall be no dry spots, lifts, ridges, splits, cracks, uncured resin, delaminations or other defects in the CIPP lining. Wrinkles in the finished liner that cause significant backwater, reduce the pipe's hydraulic capacity or structural stability or that create voids between the liner and pipe wall will be unacceptable. Defective lining will be removed and the pipe re-lined at no additional cost to the Owner. If during the removal process, the host pipe is damaged, Contractor will perform a point repair at Contractor's own expense.
- D. Groundwater infiltration through the liner shall be zero. Leakage testing of the CIPP liner shall be accomplished during cure while under a positive head.
- E. Preliminary acceptance of CIPP lining shall be based on the Engineer's evaluation of the installation and curing data, results of air testing where required, and review of the TV digital recordings.

#### 3.04 FINAL ACCEPTANCE

- A. Final acceptance of the liner shall be based on the preliminary acceptance of the liner by the Engineer in Section 3.03 and on the results of the certified laboratory tests on the liner specimens in Section 3.01.P.
- B. Liners shall meet or exceed the certified thicknesses and specified strengths, as evidenced by the certified laboratory testing results.

#### 3.05 CLEANUP

- A. After the liner installation has been completed and accepted, the Contractor shall cleanup the entire project area and return the ground cover to the original or better condition. All excess material and debris not incorporated into the permanent installation shall be disposed of by the Contractor.

- END OF SECTION -

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## SECTION 02767

### CHEMICAL GROUT INJECTION – PIPELINES

#### PART 1 GENERAL

##### 1.1 SCOPE OF WORK

- A. The work specified in this Section includes all labor, materials, accessories, equipment and tools necessary for chemical grouting within sewer pipes.
- B. Leak Sealing
  - 1. Sources, or possible sources, of infiltration within the sewer system, are to be sealed to eliminate infiltration.
  - 2. The application of the sealing grout within the pipe shall be by means of remote-controlled equipment designed to be positioned at the specific repair or crack to be sealed and to apply the grout under sufficient pressure for the grout to pass through the opening and fill voids outside the pipe as well as the opening in the pipe wall. Control of the device and review of the results shall be by operating the closed-circuit television camera and van-mounted monitor. The method of sealing used shall not damage the pipe or change pipe alignment, and the original cross sectional area shall not be permanently reduced or changed.

##### 1.2 RELATED WORK

- A. Specification 02765 – CIPP – Gravity Lines

##### 1.3 SUBMITTALS

- A. Submit literature and/or catalog cut sheets of the chemical grout to be used. Contractor shall submit to the ENGINEER for review and approval prior to ordering.

#### PART 2 PRODUCTS

##### 2.1 MANUFACTURERS

- A. Chemical grout sealing materials used on this project shall be AV-118 Duriflex.

##### 2.2 WATER-BASED CHEMICAL GROUTS

- A. A minimum of 10% acrylamide base material by weight in the total grout mix.
- B. A viscosity of approximately 2 centipoise
- C. A controllable reaction time from 10 seconds to 1 hour.



- D. A reaction (curing) that produces a homogenous, chemically stable, non-biodegradable, firm, flexible gel.

## PART 3 EXECUTION

### 3.01 GROUTING EQUIPMENT

- A. The basic equipment shall consist of a closed circuit television system, necessary chemical sealant containers, pumps, regulators, valves, hoses, etc., and sealing packers for the various sizes of sewer pipe. The packer shall be a cylindrical case of a size less than pipe size, with the cables at either end used to pull it through the line. The packer device shall be constructed in such a manner as to allow a restricted amount of sewage to flow at all times. When the packer is inflated, two widely spaced annular bladders shall be formed, each having an elongated shape and producing an annular void around the center portion of the packer.
- B. Before starting the work, a performance test demonstration verifying the accuracy and repeatability of the void pressure meter and fluid pumping equipment should be performed. If these test demonstrations fail to show that the readings are accurate,  $\pm 0.5$  psi (3 kPa) for void pressure repeatability, and  $\pm 0.1$  (0.4 L) of chemical pumped into a measured container, the Contractor shall be required to make the required repair or adjustments to the equipment and gages and retest until the results are satisfactory to the Owner's representative. The test demonstration may be required at each work shift during the sealing operation.

### 3.02 GROUTING PROCEDURE

- A. In the preparation and application of the sealing grout, the recommendations of the manufacturer of the grout materials shall be followed. Before sealing, chemical grout gel times should be measured and recorded. Gel times should also be measured and recorded whenever a new batch is made and at the end of the shift. These gel times measurements are a very effective and meaningful quality assurance procedure.
- B. Grout sealing shall be accomplished by forcing chemical sealing materials into or through infiltration points by a system of pumps, hoses, and sealing packers. Jetting or driving pipes from the surface that could damage or cause undermining of the pipe lines, will not be allowed. Excavating the pipe, which would disrupt traffic, undermine adjacent utilities and structures, will not be allowed. The packer shall be positioned over the area of infiltration by means of a metering device and the closed circuit television in the line. It is important that the procedure used by the Contractor for positioning the packer be accurate to avoid over-pulling the packer and thus not effectively sealing the point of infiltration. The packer sleeves shall then be expanded using precisely controlled pressures. The pneumatically expanded sleeve or elements shall seal against the inside periphery of the pipe to form a void area at the point of infiltration, now completely isolated from the remainder of the pipe line. Into this isolated area, sealant materials shall be pumped through the hose system at controlled pressures, which are in excess of groundwater pressures. The pumping, metering, and packer device shall be integrated so that the proportions and quantities of materials can be regulated in accordance with the type and size of the leak being sealed.
- C. A color additive (dye) shall be added to the grout so that a visual residual layer of grout rings the repairs providing confirmation the packer was located over the repair and the void was filled during the sealing operation.

- D. No repair shall be considered sealed unless, while under continual pressure, an attempt is made to pump grout to "refusal" (up to ½ gallon per inch diameter pipe size). This is to insure that sufficient chemical has been dispersed into the soil surrounding the repair and that a temporary seal has not been made by applying a minimum amount of chemical grout to the void and the repair area inside the pipe. When chemical grout cannot be pumped to "refusal" within a volume less than or equal to ½-gal per inch diameter pipe size due to latent physical conditions, no additional work shall be undertaken until authorization to proceed has been given by the Owner's representative.
- E. Upon completing the sealing of each repair, the packer shall be deflated; moved at least one packer length in either direction, and then repositioned over the next repair; with the void pressure meter reading zero pressure. Should the void pressure meter not read zero, the Contractor shall clean his equipment of residual grout material or make the necessary equipment repairs to provide for an accurate void pressure reading.
- F. It shall be the responsibility of the Contractor to completely seal every leak. If in the Owner's opinion, it is not necessary to continue with a particular leak, the crew shall move to the next repair or leak.
- G. The Contractor shall remove any small excess sealing grout inside the sewer line.
- H. Contractor shall operate his equipment with care and shall be responsible for any damage to the sewer system or other facilities caused by his operations, and shall repair such damage at his expense and without delay as instructed by the Owner.

- END OF SECTION

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## SECTION 02766

### HYDROPHILIC END SEALS

#### PART 1 – GENERAL

##### 1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required to install hydrophilic end seals as specified herein.

##### 1.02 RELATED WORK

- A. Specification 02765 – CIPP – Gravity Lines

##### 1.03 SUBMITTALS

- A. Submit literature and/or catalog cut sheets of the end seals to be used. Contractor shall submit to the ENGINEER for review and approval prior to ordering.

##### 1.04 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
  - 1. ASTM D 412 – Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers
  - 2. ASTM D2240 – Standard Test Method for Rubber Property.
- B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

##### 1.05 DELIVERY, STORAGE AND HANDLING

- A. Care shall be taken in shipping, handling and storage to avoid damage. Extra care shall be taken during cold weather construction.

#### PART 2 -- PRODUCTS

##### 2.01 HYDROPHILIC END SEAL

- A. End seal shall be a one-piece sleeve, 3-inch wide, compression gasket made of hydrophilic neoprene rubber having the following characteristics:

1.	Shore A Hardness (min)	ASTM D2240	50
2.	Tensile Strength (min)	ASTM D412	1100 psi
3.	Elongation at Break (min)	ASTM D412	500%

- 4. Swell capacity in water (min) 200%
- B. The use of caulking, rope or band type of an end seal is not be allowed.
- C. Fastening bands shall consist of a shape-memory alloy. Ratcheting retaining rings are not allowed.

### PART 3 – EXECUTION

#### 3.01 INSTALLATION

- A. Installation shall be coordinated with CIPP
- B. End Seal shall be installed at both ends of the rehabilitated pipe near the interface using the mechanical fastener provided by the end seal manufacturer in strict accordance with the manufacturer's installation guidelines and recommendations.

- END OF SECTION -



RECORD  
DRAWING





**Request for Construction  
Change Order No. 4**

City of Franklin  
Engineering Office  
109 Third Avenue South  
Franklin, TN 37064

Contract No. 2017-0131  
Project 54" Southeast Interceptor Sewer  
Emergency Repair

Whereas, we **GARNEY COMPANIES INC.** entered into a contract with the CITY OF FRANKLIN, on June 21, 2017, for the construction by said Contractor of the above designated contract; and Whereas, certain items of construction encountered are not covered by the original contract, we desire to submit the following additional items of construction to be performed by the Contractor and paid by the City at the prices scheduled therefore below:

**Reason for Change Order:**

- In the original contract, connection to Manhole A-11 was assumed to be via an existing stubout. When the stubout was uncovered, it was damaged and unusable. To connect to the manhole, the bypass pumps for the existing sewer have to be relocated across the river, remove the failed pipe and install new 54" pipe

**Attachments (List documents supporting change):**

- Garney cost estimate dated September 20, 2017

**Add the following items to the existing contract:**

Item Description	Qty	Unit	Unit Price	Total
Bypass Relocation	1	LS	\$ 64,494.00	\$ 64,494.00
Seasonal Seeding (with Mulch) on all disturbed areas (Across Harpeth River)	3	AC	\$ 2,000.00	\$ 6,000.00
60-inch Core (Includes Kor-N-Seal Boot)	1	EA	\$ 51,242.00	\$ 51,242.00
Connect to SMH A-11 (54-inch DIP Provided by Owner)	1	LS	\$ 139,687.00	\$ 139,687.00
Bypass Disassembly (5% Markup per Original Proposal Dated May 16, 2017)	1	LS	\$ 16,863.00	\$ 16,863.00
Silt Fence	100	LF	\$ 5.00	\$ 500.00
			<b>TOTAL</b>	<b>\$ 278,786.00</b>
1. Includes relocation of bypass pumps to SMH A-13 and discharge line crossing Harpeth River.				
2. Additional seed and mulch is for disturbed area in park around SMH A-12.				
3. Estimated to take 3 weeks to complete this work.				

CHANGE IN CONTRACT PRICE:
Original Contract Price
<u>\$1,322,930.00</u>
Net Increase (Decrease) from previous Change Orders
No. 0 to 1: <u>\$1,587,140.00</u>
Contract Price prior to this Change Order:
<u>\$2,910,070.00</u>
Net Increase (decrease) of this Change Order:
<u>\$278,786.00</u>
Contract Price with all approved Change Orders:
<u>\$3,188,856.00</u>

CHANGE IN CONTRACT TIMES:
Original Contract Times:
Substantial Completion: N/A
Ready for final payment: N/A
Net change from previous Change Orders No. 0 to _ to:
Substantial Completion: N/A
Ready for final payment: N/A
Contract Times prior to this Change Order:
Substantial Completion: N/A
Ready for final payment: N/A
Net increase (decrease) this Change Order:
Substantial Completion: N/A
Ready for final payment: N/A
Contract Times with all approved Change Orders:
Substantial Completion: N/A
Ready for final payment: N/A

Now, Therefore, We, **GARNEY COMPANIES INC.** Contractors, hereby agree to this Supplemental Agreement consisting of the above mentioned items and prices, and agree that this Supplemental Agreement is hereby made a part of the original contract and will be performed by this Contractor in accordance with specifications thereof, and that the original contract remain in full force and effect, except in so far as specifically modified by this supplemental Agreement.

**RECOMMENDED FOR APPROVAL BY:**


By: Michael Chen, Hazen  
Design Engineer  
Date: 10/26/17

By: Patricia McNeese  
Patricia McNeese, City Project Manager  
Date: 10/27/17

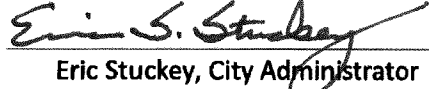
By: Michelle Hatcher  
Michelle Hatcher, Water Management Director  
Date: 10/27/17



**ACCEPTED:**

By:  GARNEY  
Contractor (Authorized Signature)  
Date: 10-26-17

**APPROVED:**

By:  Eric Stuckey, City Administrator  
Date: 11-3-2017

**Request for Construction  
Change Order No. 5**

City of Franklin  
Engineering Office  
109 Third Avenue South  
Franklin, TN 37064

Contract No. 2017-0131  
Project 54" Southeast Interceptor Sewer  
Emergency Repair

Whereas, we GARNEY COMPANIES INC. entered into a contract with the CITY OF FRANKLIN, on June 21, 2017, for the construction by said Contractor of the above designated contract; and Whereas, certain items of construction encountered are not covered by the original contract, we desire to submit the following additional items of construction to be performed by the Contractor and paid by the City at the prices scheduled therefore below:

**Reason for Change Order:**

- During the recent Multi-Sensor Inspection of the 54" gravity sewer upstream of the WWTP, a longitudinal crack was discovered in the crown of a pipe segment approximately 20' from SMH-10332 and a circumferential crack 42' upstream from that. The results of an additional geotechnical investigation on the subsurface conditions around the failed pipe were to increase the lateral bearing capacity of the soil. This would be accomplished by installing compaction grout down to the firm foundation on each side of the pipe. Once the grouting is complete, which will increase the compaction of the backfill on each side and haunch of the pipe in order to prevent future pipe deflection, a CIPP (cured in place pipe) will be installed inside the existing 54" diameter pipe for its entire length from SMH-10332 to SMH-10482. The CIPP will not rely on the host pipe to supply any structural assistance but only to provide a mold for the CIPP to be formed inside. This should provide the City with reliable long term service.

**Attachments (List documents supporting change):**

- Letter from Hazen and Sawyer dated January 15, 2018

Item	Item Description	Qty	Unit	Unit Price	Total
S-1	54-inch Cured-in-Place Pipe, 42 mm thickness	300	LF	\$956	\$286,800.00
S-2	Manage/Operate Sewer Bypass Pumping System Prior to Construction, "Idle Condition"	112	DAYS	\$961	\$107,632.00
S-3	Manage/Operate Sewer Bypass Pumping System During Construction, "Pumping Condition"	14	DAYS	\$3,100	\$43,400.00

S-4	Fuel used based on Engine Hours, Average RPM, and Average \$/gallon price (with appropriate supporting calculations and sample fuel delivery invoices)	1	LS	\$10,000	\$10,000.00
S-5	Remove and Re-install MH cone section	2	EA	\$3,000	\$6,000.00
S-6	Install and remove Pipe Plugs for Bypass Pumping System	1	LS	\$4,875	\$4,875.00
S-7	Thoroughly Clean 54" host pipe to receive CIPP, Waste material shall be disposed of offsite at On-Site Environmental	1	LS	\$7,875	\$7,875.00
S-8	Reset 54" Plugs and Bypass Pumping System to Facilitate CIPP Installation	1	LS	\$6,500	\$6,500.00
S-9	Replace MH frame and Cover, "Water Tight"	1	EA	\$600	\$600.00
S-10	Silt Fence, along work area	500	LF	\$5	\$2,500.00
S-11	CIPP 3rd Party Material Testing	2	EA	\$395	\$790.00
S-12	CCTV inspection, post installation prior to service	300	LF	\$10	\$3,000.00
S-13	Geotechnical Investigation, Cone Penetrometer	1	LS	\$26,587	\$26,587.00
S-14	LMG, Compaction Grouting Design	1	LS	\$15,000	\$15,000.00
S-15	Field Survey, Layout for Geotechnical and Grouting Program	1	LS	\$1,500	\$1,500.00
S-15	LMG, Compaction Grouting Installation	1	LS	\$188,950	\$188,950.00
S-16	Final Cleanup and Surface Restoration	1	LS	\$15,000	\$15,000.00
S-17	Mobilization	1	LS	\$50,000	\$50,000.00
S-18	Contingency Allowance, used by approval from Owner/Engineer	1	LS	\$50,000	\$50,000.00
				<b>Total</b>	<b>\$827,009.00</b>



Add the following items to the existing contract:

CHANGE IN CONTRACT PRICE:
Original Contract Price
<u>\$1,322,930.00</u>
Net Increase (Decrease) from previous Change Orders
No. 0 to 1: <u>\$1,587,140.00</u>
Contract Price prior to this Change Order:
<u>\$3,188,856.00</u>
Net increase (decrease) of this Change Order:
<u>\$827,009.00</u>
Contract Price with all approved Change Orders:
<u>\$4,015,865.00</u>

CHANGE IN CONTRACT TIMES:
Original Contract Times:
Substantial Completion: N/A
Ready for final payment: N/A
Net change from previous Change Orders No. 0 to _ to:
Substantial Completion: N/A
Ready for final payment: N/A
Contract Times prior to this Change Order:
Substantial Completion: N/A
Ready for final payment: N/A
Net increase (decrease) this Change Order:
Substantial Completion: N/A
Ready for final payment: N/A
Contract Times with all approved Change Orders:
Substantial Completion: N/A
Ready for final payment: N/A

Now, Therefore, We, **GARNEY COMPANIES INC.** Contractors, hereby agree to this Supplemental Agreement consisting of the above mentioned items and prices, and agree that this Supplemental Agreement is hereby made a part of the original contract and will be performed by this Contractor in accordance with specifications thereof, and that the original contract remain in full force and effect, except in so far as specifically modified by this supplemental Agreement.

**RECOMMENDED FOR APPROVAL BY:**

By: Michael Orr, HAZEN  
Design Engineer

Date: 5/10/18

By: Michelle Hatcher  
Michelle Hatcher, Water Management Director

Date: 6/20/18

**APPROVED:**

By: [Signature]  
Contractor (Authorized Signature)  
Stephen P. Ford, Vice President

Date: 5/14/18

**ACCEPTED:**

By: [Signature]  
Eric Stuckey, City Administrator

Date: 7-2-2018