

TOWN OF BROOKSVILLE, MS
CDBG SEWER REHABILITATION PROJECT
Project No. 1137-20-131-PF-01

ADDENDUM #2
March 7, 2022

The Contract Documents, Plans and Specifications shall be amended as set forth herein below:

CONTRACT DOCUMENTS & SPECIFICATIONS

The following changes are being made to the Bid Proposal:

In Section P titled ***Proposal***, replace page(s) **PF-4** in its entirety with the **attached** page(s) **PF-4**.
This is based on the following changes:

Base Bid Page PF-4: The following Pay Items were added.

Pay Item 21: 4" or 6" Lateral Grout Sealing, Quantity 10, Unit EACH

Pay Item 22: 4" or 6" Sewer Service Joint Tee Connection, Quantity 10, Unit EACH

The following **attached** specification shall be added to the Technical Specifications:

SECTION 4500 Sewer Lateral Connection Sealing

CONSTRUCTION PLANS:

The following changes are made on Sheet 2:

Under the ***Summary of Quantities – Base Bid***, Add the following Pay Item(s)

Pay Item 21: 4" or 6" Lateral Grout Sealing, Quantity 10, Unit EACH

Pay Item 22: 4" or 6" Sewer Service Joint Tee Connection, Quantity 10, Unit EACH

NOTE: Bidders shall acknowledge receipt of this addendum on Page P-1 of the Bid Proposal.



Calvin Dean, P.E., Principal
Crown Engineering, PLLC

Date: March 7, 2022

BASE BID (con't)

Item No.	Description	Quantity	Units	Unit Price	Total
13	New 10" PVC (SDR-26) Sanitary Sewer (Includes bedding material) (0-8' Deep) (Complete-in-Place)	50	LF		
14	4" or 6" Sanitary Sewer Service Line Reinstatement	28	EACH		
15	Temporary By-Pass Pumping	1	LS		
16	Excavation	100	CY		
17	Select Backfill (Offsite) (Compacted & In-Place)	150	CY		
18	Clay Gravel (Compacted & In-Place)	60	CY		
19	4" Asphaltic Roadway Repair	75	TN		
20	Seeding, Fertilizer, & Mulch	1	AC		
21	4" or 6" Lateral Grout Sealing	10	EACH		
22	4" or 6" Sewer Service Joint Tee Connection	10	EACH		
TOTAL BASE BID					

SECTION 4500

SEWER LATERAL CONNECTION SEALING BY CHEMICAL GROUT

PART GENERAL

1.1 DESCRIPTION

Section includes requirements for rehabilitation of defective lateral-mainline interfaces by application of chemical grout material.

1.2 DEFINITIONS

Mainline: Sewer Main.

Lateral: Service pipe from property line to mainline.

Lateral-Mainline Interface: Lateral connection to mainline.

Lateral-Mainline Interface Seal: Watertight seal between lateral and mainline.

1.3 QUALITY ASSURANCE

A. Follow ASTM F2304 and F2454.

B. Commercially Proven Products:

1. Minimum 10,000 mainline joints and 1,000 lateral-mainline interfaces successfully grouted and documented in the United States and Internationally.

C. Personnel involved in sealing of joints and lateral connections: Certified by grout manufacturer they have successfully completed training in handling, mixing and application of grout for sanitary sewer line and joint and lateral connection sealing.

D. Third-Party Inspector: Minimum of 5 year's experience in Chemical grouting applications and have no financial or directorial link to grout manufacturer or Contractor.

E. Engineer may inspect and test grout at factory, before delivery to site, while in storage, or prior to use.

F. Internally CCTV inspect host pipe prior to grouting, during grouting and post grouting.

1.4 SUBMITTALS

1. Catalog data showing manufacturer's clarifications and updates, ASTM references, material composition, specifications, and physical and chemical properties of grout.
2. Manufacturer's recommended procedures for handling, storing, mixing and injecting grout.
3. Documentation for Products and Installers: Engineer's approval required before acceptance or injection of grout.
4. Method of Construction.
 - a. Access manholes and site locations.
 - b. Impacted portions of existing sewer.
 - c. Site access points.
 - d. Bypass pumping plan as required.
6. Grout manufacturer's certification that Contractor is approved installer of their system. Certificates of training in handling, mixing, and application of grout for sanitary sewer line and joint and lateral connection sealing for grout truck operator and at least one crewmember involved in sealing process.
7. Third party lab test results for field installations in United States of same grout system as proposed for actual installation.
8. Pump calibration information.
9. Test results must verify grout physical and chemical properties specified herein have been achieved in previous field applications.
10. CCTV inspection reports and electronic downloads before and following sewer joint sealing. Furnished to Engineer after completion of work.
11. Field sealing records.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect, store, and handle grout or other material during transportation and delivery, while stored on-site, and during installation following manufacturer's recommendations.
- B. Grout Material found defective or damaged due to manufacture or shipment:
 1. Remove from Contract site and replace, following Engineer's direction, at no cost to the Owner

PART 2 PRODUCTS

2.1 MATERIALS

A. Grouting.

1. Properties and Characteristics.

- a. Will perform in presence of infiltrating water, during injection.
- b. Packaged for field storage, handling requirements with minimum spillage and worker safety.

2. Cured grout:

- a. Submergible in water without degrading.
- b. Not biodegradable. Additives may be used to meet this requirement, without effecting long-term strength.
- c. Chemically stable and resistant to concentrations of acids, alkalis, and organic materials found in normal sewage.

3. Composition.

a. Acrylamide gel:

- 1) Minimum of 10 percent acrylamide base material by weight in total grout mix.
- 2) Higher concentration percent of acrylamide base material (maximum 20%) may be used to increase strength or offset dilution during injection.
- 3) Able to tolerate some dilution and react in moving water during injection.
- 4) Approximately 2 centipoise viscosity. Can be increased with additives.
- 5) Constant viscosity during reaction period.
- 6) Controlled reaction time from 10 seconds to 1 hour.
- 7) Curing reaction producing a homogenous, chemically stable, non-biodegradable, firm, flexible gel.
- 8) Able to prevent dehydration and increase-mix viscosity, density and gel strength by use of additives.
 - a. Diatomaceous earth (Celite 209 or equal) can be added to concentration of five percent.
 - b. Use of other additives following manufacturer's recommendation and Engineer's approval.
- 9) Root control additive 2, 6-Dichlorobenzonitrile, may be added following manufacturer's recommendation and Engineer's direction.

b. Urethane gel:

- 1) Ratio: One part urethane prepolymer mixed with 5 to 10 parts water by volume.
Recommended mix ratio: 1 part urethane prepolymer to 8 parts of water (11 percent

prepolymer).

2) Liquid prepolymer:

- a. Solids content: 77 to 83 percent.
- b. Specific Gravity: 1.04 (8.65 pounds per gallon)
- c. Flash Point: 20 degrees F.
- d. Viscosity: 600 to 1,200 centipoises water at 70 degrees F.

3) Water for reacting prepolymer: pH of 6.5 to 8.

4) Curing reaction:

- a. Produces chemically stable, non-biodegradable, tough, flexible gel.
- b. Able to increase mix viscosity, density, gel strength and resistance to shrinkage by using additives in water component of grout.
- c. Minimum 15 percent shrink control agent supplied by the same manufacturer.

c. Acrylate gel:

- 1) Minimum 10 percent acrylate base material by weight or as specified by the manufacturer.
 - a. In total grout mix, a higher concentration (percent) of acrylate base material may be used to increase strength or offset dilution during injection.
 - b. If acrylate base material is in 40 percent solution 27.5 percent by weight of total grout mix: 11 percent base material.
- 2) Able to tolerate some dilution and react in moving water during injection.
- 3) Viscosity: Approximately 2 centipoises.
 - a. Can be increased with additives
- 4) Constant viscosity during reaction period.
- 5) Controlled reaction time: 10 seconds to 1 hour.
- 6) Curing reaction producing homogeneous, chemically stable, non-biodegradable, flexible gel.
- 7) Able to prevent dehydration and to increase-mix viscosity, density and gel strength by use of additives.
 - a. Diatomaceous earth (Celite 209 or equal) can be added to concentration of five percent, by volume.
 - b. Use of other additives following manufacturer's recommendations and Engineer's approval.
- 8) Root control additive 2, 6-Dichlorobenzonitrile, may be added following manufacturer's recommendation and Engineer's direction.

2.2 EQUIPMENT

A. General.

1. CCTV system, necessary chemical grout containers, pumps, regulators, valves, hoses, joint sealing packers for various sizes of sewer pipes, and lateral bladders.
2. Air pressure monitoring system:
 - a. Configured with no valves on air line between measuring point and pressure sensing device.
 - b. Digital readouts located at control panel in grouting truck.

B. Grouting packer:

1. Diameter less than pipe size, with cables attached at each end to pull it through the line.
2. Designed to allow restricted amount of sewage to flow through device, in mainlines where sewage flows do not exceed maximum depth for joint testing/sealing following manufacturer's recommendation and following ASTM F2304 and ASTM F2454.
3. Approved Manufacturers:

Logiball, Inc.

Cues, Inc.

Or Approved Equal.

PART 3 EXECUTION

3.1 PREPARATION

A. Access.

1. Chemical grout sealing of lateral-mainline connections: Through mainline sewers.

B. Surface Preparation following the installation of Mainline CIPP Liner and Lateral Reinstatement Procedure. (See Section 4400).

1. Cleaning of Main Line Sewers and Laterals.
 - a. Before sealing work, lightly clean each line section.
 - b. Remove sludge, dirt, sand, grease, root, and other materials from pipe and collect

and remove resulting debris from downstream manhole of sewer section being cleaned.

- c. Collect debris and remove from site. Following jurisdictional requirements and Engineers' approval.

3.3 TESTING

A. Performance Test Demonstrations.

1. Before start of work, verify accuracy and repeatability of void pressure meter and fluid pumping equipment.
2. If test demonstrations fail to show accuracy of ± 0.5 psi for void pressure repeatability and ± 0.1 gallon of chemical pumped into measured container or bucket, make required repairs or adjustments to equipment and gauges and retest until results meet Engineers satisfaction.
3. Test may be required at commencement of each work shift during sealing operations.

B. Mainline Joint Pressure Air Testing.

1. Before testing, perform control tests at ground surface to verify accuracy, integrity, and reliability of testing equipment following ASTM F2304.
2. After entering each pipe segment through manhole, and immediately before joint pressure air testing, perform an intermediate test on pipe between joints following ASTM F2454.
3. Maintain joint testing air pressure of 3 psi higher than groundwater pressure outside the pipe, up to maximum of 10 psi. If groundwater pressure data is not available, use joint testing pressure of 0.5 psi per vertical foot of pipe depth or 10 psi, whichever is greater.
4. Perform testing following ASTM F2304. Seal joints that do not maintain void pressure drop of less than 1 psi in 15 seconds.

C. Lateral Connection Pressure Air Testing.

1. Before lateral connection testing, perform control tests at ground surface to verify accuracy, integrity and reliability of testing equipment following ASTM F2454-05.
2. Maintain joint testing air pressure of 3 psi higher than groundwater pressure outside the pipe, up to maximum 6 psi. If groundwater pressure data is not available, use joint testing pressure of 0.5 psi per vertical foot of pipe depth or 6 psi whichever is greater.
3. Perform lateral connection testing following ASTM F2454. Seal joints that do not maintain void pressure with pressure drop of less than 2 psi in 15 seconds.

3.4 BASIC REQUIREMENTS

A. General.

1. Seal joints, defects or leaking lateral connections that failed air testing or show sign of visible leaks, by internal chemical methods, as directed by Engineer.
2. After sealing of joint, defect or connection, perform post air test per ASTM F2304 or ASTM F2454 for mainline sewer sealing and lateral sealing, respectively.
3. Sewer that Engineer deems damaged as a result of Contractor's operations, will be promptly repaired to Engineer's satisfaction at no cost to the Commission.
4. Grouting materials that set to a hard, rigid product capable of intrusion into sewer lines are not acceptable unless specifically approved by Engineer on a case by case basis.
5. Provide qualified, independent third party inspector to observe grouting mixing process, chemical grouting injections process and post grouting pressure testing. Report findings to Engineer.

B. Application Procedures for Joint Sealing and Lateral Connection Sealing.

1. Force chemical grouting material into or through faulty joints, defects or lateral connection by system of pumps, hoses, and sealing packers.
 - a. Position packer over faulty joint or lateral connection by means of measuring device and CCTV camera in line.
 - b. For mainline sewers, expand packer end bladders using controlled pressure. For lateral connections use lateral packer equipped with lateral bladder and rotating mechanism.
 - c. Obtain a tight seal. If a tight seal is not obtained, remove equipment and make adjustments.
 - d. Pump grout material through hose system at controlled pressures high enough to overcome external pressures such as groundwater pressures.
2. Design pumping unit, metering equipment, and packer devices so proportions and quantities of materials can be regulated following type and size of leak being sealed.
3. Set chemical pumping rates and mixing ratios as specified herein, following manufacturer's recommendations and Engineer's adjustments.
4. Determine appropriate gel set times.
 - a. To estimate gel set times, divide estimated volume of annular space (in gallons) by grout pumping rate (in gallons per minute), then add between 15 to 25 seconds. Adjust estimate by taking into account temperature of grout tanks, temperature of hoses, temperature of groundwater, amount of groundwater present and other field conditions.
 - b. The gel set time is typically between 20 and 40 seconds. Gel set times of less than 20 seconds may be required in presence of high filtration.
 - c. Monitor induction periods and gel characteristics through daily gel time tests for

each sealing vehicle. Check each new batch once. If only one batch is used, check at least twice per day.

- d. Perform new gel time test when grout additives are modified to change gel times, at beginning of new setup with new starting manhole, or when temperature in tanks and hoses changes by more than 10 degrees F from previous gel time test.
 - e. Use water with known and controlled pH that will be used during actual grouting operations.
 - f. Allow grout mixture to settle to remove entrained oxygen, before testing gel time.
 - g. Use plastic or stainless steel tanks. Do not use tanks that contain iron or copper.
- 5. During seal operations, operate void pressure monitoring equipment, described herein.
 - 6. Integrate CCTV, grout pumping, and air pressure monitoring equipment so proportions, quantities, and void pressure for materials and sealing can be instantly monitored and regulated following type and size of joint, break, or leak.
 - 7. Amount of chemical being pumped: Based on number of pumped strokes delivered for each sealed sewer main joint, defect or leaking connection. Record and provide results to Engineer.
 - 8. If large voids are encountered on outside of sewer, including the possibility of “piping” holes to ground surface, which could cause excessive use of grout material, at Engineer’s direction change operating pressures and pumping rates as follows.
 - a. Reduce pressures and pumping rates, such that intervals between pump strokes are shorter than gel time.
 - b. Pump first stage of grout, and then stop pumping until temporary gel of the grout is obtained on outside of pipe.
 - c. Increase pressure and pumping rate to pump the second stage and form a second layer.
 - d. Repeat this cycle until refusal conditions are reached, or until the inspector judges the grout consumption to be excessive.
 - e. Avoid sealing inner surface of pipe from inside before building up layers on the outside.
 - 9. Grout injection complete: When chemical grout is pumped to refusal as defined in ASTM F2304.
 - a. If chemical grout cannot be pumped to refusal, within a volume less than or equal to 0.5 gallons per inch of pipe diameter due to latent physical conditions, do not perform additional work until Engineer grants authorization.
 - b. Lateral connections: When back pressure of grout in void at mainline level drops from 8 psi to 6 psi in greater than 20 seconds after cessation of grout pumping,

following ASTM F2454. If using stage grouting, grout injection is complete when refusal pressure of 8 psi is achieved.

10. Sealed Defects.

- a. Remove excess grout gel ring if obtrusive and impedes air testing and CCTV inspection of work as required. If excess grout gel ring cannot be removed by use of packer, jet clean pipe prior to testing seal.
- b. Air test each sealed joint.
 - 1) If defect or connection fails air test after grout injection, reseal failed joints and air test again.
 - 2) After lateral connection has been sealed successfully as confirmed by post air test, break lateral packer seal and test service to assure grout has not blocked lateral connection further upstream. In the event sewage back-up occurs and enters a dwelling, respond within 2 hours of being notified and be responsible for cleanup, repair, property damage costs and claims.

11. Flush or push forward excess grouting material to next downstream manhole, and remove from sewer system.

- a. Dispose of debris following grout manufacturer's recommendation, and jurisdictional regulations.
- b. Excess grout material from upstream section(s) will not be allowed to accumulate in sewer.

12. Provide approved plug and/or by-pass pumping if grouting operations restrict or prevent simultaneous sewage flow passage.

C. Joint, Defect or Lateral Connection Sealing Verification.

1. Mainline joints and defects.

- a. Deflate packer bladders after completing each seal until zero void pressure (± 0.5 psi) is shown on the monitoring equipment.
- b. If zero void pressure (± 0.5 psi) is not achieved, clear residual grout material from packer or make needed equipment adjustments allowing true pressure reading.

2. Re-test joint, defect or lateral connection as described herein.

- a. Re-seal joints, defects, or connections that do not meet specified test criteria and re-test until test criteria are met, or Engineer determines that joint defect, or lateral connection cannot be sufficiently sealed.

- b. Additional testing and sealing will be at no additional cost to the Owner

D. Residual Sealing Material.

1. Leave no residual grout material capable of reducing pipe diameter or restricting flow greater than 5 percent pipe capacity.

E. Obstructions.

1. During course of sealing operations obstructions may be encountered preventing travel of packer and camera. Should obstruction not be passable, begin sealing operations from opposite end of sewer reach.
2. If additional obstructions are encountered after re-employment and no means are available for passing obstructions without damage to equipment, remaining sections of sewer main not sealed may be temporarily excluded from work requirements of Contract, until point repair is completed.

3.5 FIELD DOCUMENTATION

A. Records.

1. Keep complete, accurate, and legible records of operation for each joint, defect or connection sealed. Include on Record of Operation for each joint or lateral mainline interface tested and/or routed or attempted to be grouted. Identification of work site, complete component and address. Grout mixture formation, including additives and catalyst mixture.
 - a. Test pressures and durations of tests maintained for each joint passing the air test.
 - b. Ambient outside air temperature at time of grout injection.
 - c. Grout tank temperatures.
 - d. Gel time and time last verified.
 - e. Verified address of lateral.
 - f. Estimated visible leakage (gpm) from joint/defect connection or lateral.
 - g. Number of pump strokes and amount of grout in place.
 - h. Beginning, ending, pressure losses, re-test pressures.
 - i. Verification lateral is clear after sealing process.
 - j. Remaining leakage and location after seal (gpm).
2. Work site will not be accepted until Engineer receives original record.

Failure to fill out logs completely will result in non-payment for the questioned mainline joint, defect or connection.

3.6 WARRANTY

- A. Provide twelve month performance and workmanship warranty for the seals from date of acceptance of the Owner
- B. Reseal all joints sealed under this Contract that inspector finds defective within warranty period, at no additional cost to the Owner
 - 1. Defective seals include, but not limited to those with root penetration, signs of infiltration, and cracks in pipe or grouting material.
- C. If failure rate of retested joints and lateral connections is 5 percent or less of joints and lateral connections retested, work shall be considered satisfactory and no further retesting will be required. If the failure rate of retested joints and lateral connections is greater than 5 percent, the Engineer shall randomly select another retest area consisting of another 10 percent of the initially sealed joints and lateral connections. Continue this additional retesting and resealing until a failure rate of less than 5 percent is met.

3.7 ACCEPTANCE

When sealed joint, defect, and lateral connections pass the post air test.

PART 4 MEASUREMENT AND PAYMENT

4.1 LATERAL CONNECTION SEALING

- A. Measurement: By each lateral connection sealed and air tested, which includes up to two gallons of grout per joint or defect.
- B. Payment: At unit price for size listed in Bid Schedule.
 - 1. Payment includes plugging or by-pass pumping, traffic control, CCTV inspections, pre-sealing cleaning, removal of extraneous materials from sewer main and lateral, labor and equipment necessary to seal connection, post sealing air test, and test to ensure that lateral is clear.

4.2 RETESTING SEALED JOINTS UNDER WARRANTY

- A. No compensation will be provided for resealing joint that fails air testing.