

ITEM 49

PIPE BURSTING GRAVITY SEWERS

1.0 DESCRIPTION. This specification covers the requirements for sewer renewal using the pipe bursting method. It has been developed to enable sewer pipe to be replaced without open-cutting. The Contractor shall provide all materials, labor, equipment, and services necessary for bypass pumping, and/or diversion of sewage flows, ground water control, rehabilitation of existing sanitary sewers by bursting the existing pipe and inserting a fusible PVC or HDPE (SDR 17) pipe, reconnection of active sewer lateral connections, anchoring new pipe, and initial and final cleaning & CCTV inspection and final testing of the pipe system, including, but not limited to:

- A. Site planning and Preparation.**
- B. Pipe Installation.**
- C. Cleanup and Restore.** (Existing surface condition and structures.)
- D. Repair Defective Work.** (Per Engineer's final inspection.)

2.0 SUBMITTALS. The Contractor shall submit the following information:

- A. Reference Standards:** This specification references American Society for Testing and Materials (ASTM), American Welding Society (AWS), American Water Works Association (AWWA), and NSF standard specifications, which are made a part hereof by such reference and shall be the latest edition and revision thereof. Conformance to the following shall be required:
- 1. AWWA C900 Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. through 12 in., for Water Distribution.
 - 2. AWWA C905 Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 in. through 48 in., for Water Distribution.
 - 3. AWWA C906 Polyethylene Pressure Pipe and Fittings, 4 in. through 65 in.
 - 4. ASTM D-1238 Measuring Flow Rates of Thermoplastics by Extrusion Plastometer.
 - 5. ASTM D-1505 Density of Plastics by the Density-Gradient Technique
 - 6. ASTM D-1599 Test for Short Term Rupture Strength of Plastic Pipe, Tubing and Fittings.
 - 7. ASTM D1784 Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl Chloride (CPVC) Compounds.
 - 8. ASTM D1785 Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120 Test Method for Degree of Fusion of Extruded.
 - 8. ASTM D-2122 Determining Dimensions of Thermoplastic Pipe and Fittings
 - 9. ASTM D2152 Polyvinyl Chloride (PVC) Pipe and Molded and Fittings by Acetone Immersion.

- | | |
|-----------------|--|
| 10. ASTM D2241 | Polyvinyl Chloride (PVC) Plastic Pipe (SDR-PR) |
| 11. ASTM D-2321 | Underground Installation of Thermoplastic Flexible Sewer Pipe. |
| 12. ASTM D-2837 | Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials. |
| 13. ASTM F1057 | Standard Practice for Estimating the Quality of Extruded Polyvinyl (PVC) Pipe by the Heat Reversion Technique. |
| 14. AWS D1.1 | AWS Standard Qualification Procedure |
| 15. NSF Std.#14 | Plastic Piping Components & Related Materials. |

B. Shop Drawings.

1. Shop drawings shall be furnished by the Contractor for approval by the Engineer. These drawings shall show complete design, installation, and construction information in such detail as to enable the Engineer to determine the adequacy of the proposed units for the intended purpose.
2. The drawings shall include a schedule, which will list the size and type of pipe, the location where they are to be used.
3. The Contractor shall provide one (1) electronic copy of materials, equipment, catalog data and manufacturer's technical data showing complete information on material composition, physical properties, and dimension of pipe and fittings. Include manufacturer's recommendation for handling, storage, and repair of pipe and fittings if damaged.
4. Shop drawings shall indicate all principal dimensions, general construction and materials for the sewer system as specified herein.
5. Shop drawings shall:
 - a. Show relationship of all sewer components, connections, and support items.
 - b. Be complete in all details and include identified parts lists.
 - c. Be submitted for review and approval and will be returned within two (2) weeks either approved or marked up for further design.
 - d. Not be Manufacturer's catalog or general web-site information. These types of submittals will NOT be sufficient to fulfill shop-drawing requirements and returned as Not Approved.
 - e. All shop drawings submitted for review electronically via email and shall be reviewed and returned within two weeks either approved or marked up for further design.
 - f. After examination of such drawings by the Engineer and the return thereof, the Contractor shall make such correction to the drawings as have been indicated and shall furnish the Engineer with electronic corrections.
6. If requested by the Engineer, the Contractor must furnish additional copies.
7. Resident Notifications. The Contractor shall submit a copy of the resident notification as described herein.
8. Television inspection reports and video made prior to and after pipe insertion. (See Item 40 of these Specifications for details of submittals).
9. Grout and concrete design mixes and testing reports.

10. The Contractor shall submit a sewage bypass pumping and/or diversion plan for review by the Engineer at least 10 days prior to pipe installation. The sewage bypass pumping and/or diversion plan shall include an emergency response plan to be followed in the event of a failure of the bypass pumping and/or diversion system. The Contractor shall notify the Engineer 24 hours prior to commencing the bypass pumping operation. The Contractor's plan for sewage bypass pumping and/or diversion shall conform to Item 51 of these Specifications and be satisfactory to the Engineer before the Contractor shall be allowed to commence sewage bypass pumping and/or diversion.
11. As-built drawings: The Contractor shall indicate and draw, with clear and accurate dimensions, on plans the as-built locations of newly installed sewer mains, laterals and cleanouts.

C. Calculations.

1. The Contractor shall prepare and submit for the Engineer's approval a detailed description of the Pipe Bursting Plan, including but not limited to, materials and equipment, lateral reconnection, bypass pumping system, plan of operation, schedule of work, etc. No work shall begin prior to approval by the Engineer of the Contractor's Pipe Bursting plan. The followings should be included:
2. Detail drawings and written description of the entire construction procedure to bypass sewage flow, install pipe, reconnection of sewer house connections.
3. Working drawings for showing excavation locations, dimensions, sheeting and shoring, method of dewatering, and other utilities that may be affected; width and length of working area, access pit, and portion of existing sewer to be removed to conduct the work; sewage flow by-pass; and maintenance of traffic.
4. Design of the sheeting and shoring for the excavations, and dewatering shall be the Contractor's responsibility.

D. Certifications.

1. Obtained from the pipe manufacturer, stating that all fusible pipe and associated fittings have been manufactured and tested in accordance with these specifications and the current standards. Submit results of factory testing and inspection regardless of whether or not they were witnessed by the Engineer.
2. Certification from pipe and/or the fusion machine manufacturer that Contractor is qualified to join, lay, and handle pipe.
 - a. Pipe Bursting Contractor shall have actively engaged in the installation of pipe using fusible PVC or HDPE pipe bursting for a minimum of five (5) years. The Contractor shall submit three (3) reference projects of equal or similar size in which they have performed pipe bursting installations of similar pipe diameter and overall length as specified herein, within the last five (5) years. The following evidence of qualification shall be submitted with the Bid and shall be owners only and include the following information:
 - i. Description of project (including project size).
 - ii. Location of project.

- iii. Point of contact for each project.
 - iv. Telephone number of contact.
 - v. Project costs, start and completion dates.
- 3. Certificates of qualification for persons to be fusing pipe to verify that persons fusing pipe shall be certified under 49 CFR and have a minimum of 2 years of experience with fusing pipe of eight (8) inches or larger diameter.
- 4. Experience and training record of persons to be fusing.
 - a. Field supervisory personnel employed by the pipe bursting Contractor shall have at least five (5) years' experience in the performance of the work. Qualifications shall be submitted with Bid.
- 5. Submit written certification from the pipe manufacturer and/or fusion machine manufacturer from a test-based certification program that the fusion technician has received training in the proper use of the fusion equipment and pipe/fusion machine manufacturer's recommended fusion procedures.
- 6. Written certification shall be submitted for each technician working on the project. Technicians shall not be permitted to work on the project until proper certification is received.
- 7. Training or requalification shall have been obtained within 12 months prior to beginning work on the project.
- 8. The Contractor shall perform trial fusion welds and submit samples to the SCMSD for review prior to installation of the pipe. Full penetration welds shall provide homogenous material across the cross section of the weld. The fusion machine employed for the trial welds shall be the same machine to be utilized for the installation work.

3.0 MATERIALS. Only materials and products approved by the SCMSD may be used for this project. All material used on this project shall be new and unused unless otherwise specified and all workmanship shall be of the best quality.

A. Material Handling. The Contractor shall be responsible for all delivery, storage and handling of materials.

- 1. Transport, handle, and store pipe and fittings as recommended by the manufacturer.
- 2. If pipe and fitting become damaged before or during installation, it shall be repaired as recommended by the manufacturer or replaced as required by the Engineer at the Contractor's expense, before proceeding further.
- 3. Deliver, store, and handle other materials as required to prevent damage.

B. Sanitary Sewer Laterals and Cleanouts. Shall conform to the requirements of Item 14 of these Specifications.

C. Fusible Pipe, Joints, and Fittings. Shall conform to the following requirements:

- 1. Fusible PVC or HDPE (SDR 17) pipe shall be manufactured under the trade

names:

- a. FPVC for Underground Solutions, Inc. Poway, CA, (858) 679-9551 or engineering approved equivalent.
- b. PLEXCO Division of Chevron Chemical Company, ISCO, Charter Plastics or engineering approved equivalent HDPE manufacturer.
2. Fusible PVC pipe shall conform to ASTM D30304 or ASTM F679.
3. Fusible polyvinylchloride 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.
4. Fusible polyvinylchloride pipe shall be manufactured in a standard 40' nominal lengths.
5. Pipe shall be green in color for wastewater use.
6. PVC Pipe shall be marked as a minimum:
 - a. Nominal size (e.g., 8")
 - b. Dimension ratio, Standard Dimension Ratio or Schedule
 - c. AWWA pressure class or rating (example; PC 305)
 - d. AWWA Standard designation number
 - e. ANSI/AWWA C900-07 (or latest edition)
 - f. Extrusion production-record code
 - g. Manufacturer's Name or Trademark
 - h. Cell Classification 12454 and/or PVC material designation code 1120 may also be included.
7. HDPE pipe shall be marked as a minimum:
 - a. Nominal pipe size.
 - b. Dimension ratio (SDR).
 - c. ASTM D1248 followed by hydrostatic design basis (psi) e.g. PE 4710.
 - d. Extrusion production-record code and AWWA/ASTM standard designation.
 - e. Trademark/manufacturer identification.
 - f. Cell classification.
8. Class of pipe requirements shown or called for on the plans shall be the minimum that is acceptable.
9. Pipe shall be manufactured with 100% virgin resin. Pipe shall also have 0% recycled plastics content, and shall not consist of any rework compound, even that obtained from the manufacturer's own production using the same formulation.
10. Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.
11. HDPE pipe shall have a density of 0.964-0.974 grams/cubic centimeter per ASTM D1505. All other characteristics outlined in SCMSD Technical Specification Item 13 shall also be adhered to.
12. Unless otherwise specified, fusible pipe lengths shall be assembled in the field with butt-fused joints. The Contractor shall follow the pipe supplier's written instructions for this procedure. All fusion joints shall be completed as described in this Specification.

13. Joint strength shall be equal to the pipe as demonstrated by testing requirements. All fusion joints shall be completed as described in this specification:
 - a. Pipe lengths shall be assembled in the field with butt-fused joints in accordance with ASTM D2657 and the pipe manufacturer's written instructions shall apply.
 - b. Joint strength shall be equal to or greater than the tensile strength of the pipe and shall indicate a ductile rather than brittle fracture when tested.
 - c. Joint with fusion equipment: The fusion machine shall have hydraulic pressure control for fusing two pipe ends together and shall be equipped with gauges to monitor fusion pressures.
 - d. The machine shall be equipped with an electric or gasoline engine powered facing unit to square and trim the pipe ends smooth and provide full surface contact with the heating plate. The heating plate on the fusion machine shall be electrically heated and thermostatically controlled with a temperature gauge and be capable of maintaining 500°F with a tolerance of 10°F. Fusion temperature shall be as recommended by the pipe manufacturer.
 - e. The heater plate shall be equipped with suitable means to measure the temperature of plate surfaces and to assure uniform heating such as thermometers or pyrometers.

D. Fusion Process. Fusible 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 recommendations.

1. Fusible pipe will be fused by qualified fusion technicians, as documented by the pipe supplier. Training records for qualified fusion technicians shall be available to the Engineer upon request.
2. Each joint fusion shall be recorded and logged by an electronic monitoring device (data logger) affixed to the fusion machine. Joint data shall be submitted as part of the As-Recorded information, in accordance with this specification.
3. The fusible pipe will be installed in a manner so as not to exceed the recommended bending radius.
4. Where fusible pipe is installed by pulling in tension, the recommended safe pulling force, according to the pipe supplier, will not be exceeded.
5. Only appropriately sized and outfitted fusion machines that have been approved by the pipe supplier shall be used for the fusion process. Fusion machines must incorporate the following properties, including the following elements:
 - a. Heat plates shall be in good condition with no deep gouges or scratches within the pipe circle being fused. Plates shall be clean and free of any contamination. Heater controls shall properly function, and cord and plug shall be in good condition. The appropriately sized heat plate shall be capable of maintaining a uniform and consistent heat profile and temperature for the size of pipe being fused, per the pipe supplier's recommendations.
 - b. Carriage shall travel smoothly with no binding at less than 50 psi. Jaws shall

be in good condition with proper inserts for the pipe size being fused. Insert pins shall be installed with no interference to carriage travel.

- c. Overview of machine body shall yield no obvious defects, missing parts, or potential safety issues during fusion.
- E. **Data Logger.** The current version of the pipe supplier's recommended and compatible software shall be used. Protective case shall be utilized for the hand-held wireless portion of the unit. Datalogger operations and maintenance manual shall always be with the unit. If fusing for extended periods of time, an independent 110V power source shall be available to extend battery life.
- F. **Other Equipment.** Other equipment specifically required for the fusion process shall include the following:
 - 1. Pipe rollers shall be used for support of pipe to either side of the machine
 - 2. A weather protection canopy that allows full machine motion of the heat plate, fusion assembly and carriage shall be provided for fusion in inclement and /or windy weather.
 - 3. Fusion machine operations and maintenance manual shall always be kept with the fusion machine.
 - 4. Facing blades specifically designed for cutting fusible pipe.
- G. **Joint Recording.** Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) connected to the fusion machine. The fusion data logging and joint report shall be generated by software developed specifically for the fusion of fusible pipe. The software shall include fusible pipe based dimensional data and interfacial pressure relationships. Data not logged by the data logger shall be logged manually and be included in the Fusion Technician's joint report.
- H. **Grout.** The grout design mix shall meet or exceed 500 psi compressive strength at 28 days tested accordance with ASTM C495 or C109. Contractor may incorporate grout additives to improve its flow properties, provided the minimum compressive strength requirements are met.
- I. **Tools & Bursting Head.** Only those tools designed for the aforementioned procedures and approved by the pipe manufacturer or supplier and the Engineer, shall be used for assembly of pipe fittings to ensure proper installation. The heater plate shall be equipped with suitable means to measure the temperature of plate surfaces and to assure uniform heating such as thermometers or pyrometers. External and Internal Bead removers shall be McElroy Manufacturing, Inc. or equal. Bursting head/mechanism must be capable of pipe bursting the existing repair section with minimal damage to the immediate and above ground environment and structures.
- J. **Tracer Wire System.** All wiring and material requirements for the provision of the tracer wire system on all non-ferrous water and sewer pressure pipe (force mains,

HDD, jack & bore and pipe burst) applications shall conform with SCSE Specification Item 60 "Tracer Wire for Water & Wastewater Non-ferrous Pipe".

4.0 EXECUTION. The Contractor shall manage and coordinate on site all necessary sub-contractors in the carrying out of this work. The Contractor shall supply 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. The County will not be responsible for directing any of the operations. The Contractor is responsible for proper planning and preparation prior to commencing any pipe installation work:

- A. Perform Site Investigation.** The Contractor shall perform a careful site investigation to locate and record possible surface obstructions, locate and mark active and inactive sewer laterals; determine ground and soil conditions; and formulate and submit plans to replace the pipe, to reconstruct all sewer laterals, and to restore all structures that would be damaged by the project work.
- B. Initial Cleaning.** The sanitary sewer shall be cleaned to remove any obstructions or debris that would otherwise prevent the work from being completed. Refer to Item 52 of these Specifications.
- C. Pre-CCTV.** Inspection of the sanitary sewer to determine the general condition of the sewer, determine defective pipe sections for possible point repairs with the Engineer, and to log & verify the location of all active house laterals. Refer to Item 40 of these Specifications. The Contractor shall mark in the field the location of the existing sanitary sewer lateral.
- D. Plans for Launching Pit Excavation.** Layout for sewer bypass pumping system, marking existing buried utilities, laterals, cleanouts, etc. Review all buried utilities adjacent to the line of operation to determine if excavation is necessary to relieve transient loading during the insertion operation.
- E. Resident Notification.** The Contractor shall be responsible for business and resident notification.
This notification shall contain information about the project and the pipe bursting process using graphics as necessary to illustrate the procedure. Other information to be included shall be:
 - 1. Project number
 - 2. Project name.
 - 3. Description of the work to be performed.
 - 4. Time frames for the work.
 - 5. Equipment utilized on the project.
 - 6. Potential disturbances due to the busting process and any and all precautions to take during the course of the project, as well as the need to access plumbing to verify active service laterals and ensure they are reconnected.

7. The Contractor shall list the:
 - a. Superintendent on the job along with his/her mobile telephone number, as the primary contact.
 - b. Company name, address and telephone number as the secondary contact,
 - c. This initial resident notification shall be submitted at the pre-construction meeting for approval by the Engineer.
 - d. Upon approval, the Contractor shall immediately distribute this notification/information to all residents affected by the work.
 - e. This distribution shall be at a minimum of one (1) day in advance of the commencement of any work.

F. Accurate and Workmanlike Installation of the new sanitary sewer regardless of the method described in this section and the following subsections. Only qualified and skilled workers shall be employed for all phases of this project.

G. Safety. The Contractor shall carry out the operation in strict accordance with all applicable OSHA regulations. Particular attention is called to those safety requirements involving work on an elevated platform or any entry into a confined space, e.g. trench safety.

H. Vertical and Horizontal Alignment. Alignment is as indicated on the plans and in accordance with these Specifications.

I. Traffic Control. Traffic control shall conform to the plans and specifications of this project. Refer to Item 58 of these Specifications.

J. Excavate Launching Pit. Excavate according to the planned schedule submitted to the Engineer.

1. Existing manholes shall be utilized wherever practical, removing inverts and bottoms to permit access for installation equipment.
2. Excavation of launch pits shall be situated to provide minimum inconvenience to residents, businesses or traffic. Launch excavation pits will be situated to give maximum possible advantage to the insertion operation but more importantly to give minimum inconvenience to traffic and pedestrian users.
3. Launch pits shall not be located in the easement areas and private property without permission of the homeowner and the Engineer.

K. Bypass Pumping System. shall be complete and operational. The Contractor shall make all arrangements for bypass pumping during all times when the sewer(s) is to be out of service for any reason. Layout should take into account the location of pumps and pipes, possible pump failure contingency and avoidance of blocking entrances to homes, drives, bus stops, etc. Equipment should be selected to minimize noise levels and emissions. Refer to Item 51 of these Specifications.

- L. Necessary Excavations.** to relieve the effects of bursting to existing utilities. This is especially important in the case of gas mains or other hazardous materials. A general guideline for close proximity pipe adjacent to a bursting operation should be a minimum of 5 feet for both horizontal and vertical distance between the outer diameter of the pipe to be burst and the outer diameter of the existing adjacent pipe, surfaces or structures. This guideline does not alleviate the Contractor from responsibility to any damages or repairs of these close proximity pipe, surfaces, or structures.
- M. Expose all Active Laterals.** The Contractor shall expose the existing sewer lateral connection and make arrangements with the resident to access all the plumbing fixtures in each house and perform dye tests when necessary or other means to determine if the exposed sewer lateral connection is active. If access to the house fixtures is denied by the resident, the exposed sewer lateral connection shall be assumed active unless otherwise directed by the Engineer and shall be reconnected in accordance with these Specifications. Complete prior to insertion of new pipe.
1. Temporarily disconnect/plug all active lateral connections.
- N. Removal of Known Obstructions.** Remove any known heavy concrete reinforcement present along the line of insertion prior to operation to allow steady and free passage of the expander head.
- O. Install New Sewer.** All internal beads shall be removed by the Contractor after the cooling period using a suitable removal tool. Use of the removal tool shall not induce slits, gouges, or defects in the pipe wall. If the bead is seen to have split at any point, then the joint shall be cut from the pipeline and remade. The Contractor shall always maintain radio communication between key positions so that slowing down, stopping and starting can be performed when necessary. The Contractor shall record the general progress, insertion rates in feet per minute, reasons for stoppages, signs of failure of equipment and road or other surface damage.
- P. Anchor Pipe and Seal Manholes.** Anchor the pipe, trim and seal the annulus, grout the wall filling all voids for the full thickness of the manhole wall, and restore manhole bottom and invert as necessary.
- Q. Replace and Reestablish Existing Active Laterals, Cleanouts, etc.**
1. Reconnect all active lateral connections to the new sanitary sewer main with a watertight non-shear coupling.
- R. Disconnect and Plug Inactive Laterals.**
- S. Perform Final Cleaning.** Refer to Item 52 of these Specifications.

T. Perform Final CCTV Inspection. Ensure that the new pipe is continuous over the entire length of run, and that it shall be free from visual defects. Refer to Item 40 of these Specifications.

U. Backfill and Restore Excavations.

1. Cleanup and restore existing surface conditions and structures. The Contractor is responsible for proper cleaning and restoration of all disturbed areas:
2. Actively control and mitigate any dust and/or mud during all activities. Surfaces must be cleaned prior to end of each workday. Frequency: Daily.
3. Cleanup and restoration of the surface in improved areas.
4. Contractor shall conduct operations and schedule cleanup in a manner to cause the least possible obstruction and inconvenience to traffic, pedestrians and to adjacent property owners or tenants.
5. Upon the completion of sanitary sewer construction operations, all lines, manholes, and other structures shall be thoroughly cleaned of dirt, rubbish, debris and obstructions of any kind to the satisfaction of the Engineer, and the entire work site shall be cleaned of all waste, rubbish, and construction debris of any nature.

V. Tracer Wire System. All labor, equipment and materials necessary for installation of the Tracer wire system for all non-ferrous water and sewer pressure pipe (force mains, HDD, jack & bore and pipe burst) applications shall be in accordance with all:

1. SCSE Detail Drawings.
2. SCSE Specification Item 60.

5.0 ELECTRICAL. This section is not applicable.

6.0 QUALITY ASSURANCE. The following shall apply:

A. Testing.

1. Deflection testing; All deflection testing shall be required after a minimum of 30 days post construction as specified in Appendix 'D'. Sanitary sewer gravity mains shall be subject to a mandrel test, infiltration and leakage tests.
2. All leak and infiltration testing shall be hydrostatic testing. The Contractor shall be responsible to obtain all water necessary to perform the hydrostatic testing.
3. The Contractor shall be responsible to provide final cleaning and post CCTV of the entire sewer system after completion of all installation and testing. All post video work shall comply with and be paid for under SCMSD Item 40.
4. Continuity Testing required for the Tracer Wire System shall be done in accordance with SCSE Item 60 specification.

B. Observation.

1. SCMSD designated representative will visually observe the work performed. The representative will notify the Engineer of any discrepancies with the contract documents in the course of the Contractor performing the work. The progress observations by the SCMSD do not waive any rights or remedies, nor divest the Contractor of any responsibility for contract compliance or liability for damage.
2. The County reserves the right to require an on-site representative of the pipe bursting equipment manufacturer, knowledgeable in the use of the product(s), for a minimum of two (2) working hours per workday (10 days maximum). The cost for the on-site representative(s) will be paid by the Contractor.

C. Warranty.

1. The Contractor shall guarantee all materials and workmanship for a period of one (1) year from the acceptance of the sewer system after successfully passing all sewer testing requirements above.
2. The Contractor, at their costs, shall be responsible to repair any defects or failures, due to workmanship reported to the Contractor after the testing procedures and/or within the one (1) year warranty period. All repairs shall be made within one (1) week of notification of said defect/failure.
3. In addition to the one (1) year warranty as specified above the Contractor shall provide a two (2) year maintenance bond on the entire system equal to the amount of the Contract.
4. The Contractor shall repair any and all damages or defective work identified during final review, such damages include, but are not limited to sags, leaks, cracks, unsecured joints, visual defects, and others which in the opinion of the Engineer are not acceptable and would impair the serviceability of the new system.
 - a. Such correction shall be the responsibility of the Contractor, at no extra cost to the County, and the method of correction/repair shall be approved by the County.
5. All warranty for the Tracer Wire system shall be in accordance with SCSE Specification Item 60.

7.0 MEASUREMENT. Measurement shall be made at the unit price bid per actual lineal foot installed, as measured along the horizontal centerline of the rehabilitated sewer, complete, tested, and ready for service.

- A. **Tracer Wire System.** The entire tracer wire system installed shall be included as part of the total number of lineal feet and size of actual pipe furnished and placed, under this item, as indicated above.
- B. NO additional payments for tracer wire or marker tape shall be made.

8.0 PAYMENT. The unit price cost for all labor, equipment, tools, and all other items necessary and incidental to pipe bursting shall be included in Item 49 as specified herein. This includes but is not limited to all necessary sewer cleaning (pre-& post), necessary television observation (pre-& post), necessary point repairs, bypass pumping, traffic control, pipe preparation, fusing, bursting, lateral reestablishment(s), manhole repairs, equipment, labor, testing, and clean up required by construction means and methods to install new sanitary sewers by pipe bursting.

<u>Item</u>	<u>Measurement</u>	<u>Description</u>
49	LF	—" - —" Pipe Bursting, Fusible PVC Pipe
49	LF	—" - —" Pipe Bursting, HDPE (SDR 17)

END OF SECTION