

STANDARD SPECIFICATIONS
SECTION 02958
PIPE BURSTING SYSTEM

PART 1 GENERAL

1.1 DESCRIPTION

- A. Section includes requirements to replace existing sanitary sewers using a pipe bursting system. This includes removal and replacement of service lateral connections, connections to manholes, construction of drop manholes, and placing replacement pipelines into service.

1.2 DEFINITIONS

- A. Pipe Bursting: Process of splitting or fracturing the host sewer main and forcing the fragments into the surrounding soil, for the purpose of inserting a new pipe of equal or larger diameter.
 - 1. Accomplished by use of pneumatic, static or hydraulic bursting head, with pipe splitters as cutting wheels as needed.
 - 2. Mole or bursting head is directionally guided by host sewer main and towed under tension by winch, chain or rod assembly.
 - 3. New pipe towed or jacked in immediately behind mole or bursting head.
- B. Host Sewer Main: Existing pipeline subject to pipe bursting system, made of vitrified clay, asbestos cement, polyvinyl chloride (PVC), cast iron, concrete, steel or lined pipe.
- C. Replacement Pipe: Pipe inserted into host sewer main by pipe bursting system.
- D. Continuous Pipe: Pipe, such as High Density Polyethylene (HDPE) pipe, with welded joints, assembled and inserted to form continuous section between access pits.
- E. Sectional Pipe: Pipe, such as HDPE pipe, vitrified clay pipe (VCP), polymer pipe, or PVC pipe assembled using leak proof joints and inserted into host sewer main in sections.
- F. Renew Lateral: Replace service lateral in public space or easement by pipe bursting, or if necessary by excavation and replacement.

1.3 QUALITY ASSURANCE

- A. Follow ASTM standards.
- B. Pipe Bursting System commercially proven: Minimum of 500,000 linear feet sewer main line and 3,500 linear feet of sewer service laterals of successful wastewater

- C. Personnel performing pipe bursting:
 - 1. Certified by manufacturer of pipe bursting system having successfully completed training in:
 - a. Operating bursting head.
 - b. Installing proposed replacement pipe.
 - c. Operation and maintenance of all equipment to be used.
- D. Personnel performing fusing of HDPE pipe and fittings:
 - 1. Certified by manufacturer of fusing equipment having successfully completed training in:
 - a. Handling replacement pipe materials.
 - b. Butt fusion of pipe joints, saddle fusion of fittings for service laterals.
 - c. Operation and maintenance of all equipment to be used.
- E. Provide information regarding production, delivery, handling, and storage aspects of replacement pipe.
- F. Contractor: Internally inspect pre-bursting and post-bursting work.

1.4 SUBMITTALS

- A. Submit following Section 01330.
 - 1. Pipe bursting plan including at minimum:
 - a. Description of process to be used.
 - b. Replacement pipe and fitting selection and composition.
 - c. Recommended manufacturer's installation procedures.
 - d. ASTM references.
 - e. Layout, storage and pipe handling area requirements for maintenance of pedestrian and vehicle traffic for each project site.
 - 2. Plan for locating, exposing and re-connecting service laterals and restoring manhole connections.
 - a. Manhole connection to include waterstop/pipe restraint.
 - 3. Proposed point repair method to remove sags, offset joints and constrictions or obstructions prior to bursting.
 - 4. Bypass pumping plan following Section 02960.
 - 5. Emergency plan following Section 02530. Maintain a copy of emergency plan on site for duration of project.
 - 6. Certification backup equipment is available and can be delivered to project sites within 24 hours.
- B. Submit following Section 01450.
 - 1. Certificates of Compliance for raw materials, pipe, joints, fittings, and service connections.

2. Certificates of Training for processes to be used, including joint fusion, if applicable.
 - a. Include installer's name, date of issuance and process for which certified.
 3. Design calculations resulting in wall thickness for appropriate sized SDR for each trenchless technology installation.
 - a. Use soil depth at deepest manhole in installation.
 - b. Assume ground water table height of four feet below grade unless ground water monitoring data indicates different height.
 - c. List values of key parameters used in calculations, including but not limited to; density of soil, depth of burial, live loads, safety factors, pipe modulus of elasticity, soil modulus and total calculated pressure on the pipe.
 - d. Documentation of source of equations and methodologies used in calculations.
 - e. Allowable tensile stress during pulling of pipe.
 - f. Calculated pipe deflection versus allowable pipe deflection for selected pipe.
 - g. Critical buckling pressure.
 - h. Slip trench or entry pit dimensions for pipe insertion (as applicable).
 4. Pre-bursting and post-bursting television inspection reports following Section 02956. Complete post-bursting inspection after bursting process, reconnection of laterals and renewals are completed.
 5. Weiring Logs: pre- and post-bursting weir readings.
 - a. Mark submittals with host sewer main's sewer pipe Identification Number, Work Order number, contract number, beginning date, times, and readings, and final date, times, and readings.
 6. Pulling log to include Allowable Tensile Load (ATL) and duration of pull of the replacement pipe.
 7. Field testing results.
- C. Packing list, invoice, or delivery ticket with every shipment, to contain Contract number, type and class of pipe, length, and other pertinent information.

1.5 DELIVERY AND STORAGE

- A. Transport, handle, and store pipes and fittings as recommended by manufacturer.
- B. Replace pipe or fittings damaged before or during installation at no additional cost to the Commission.

PART 2 PRODUCTS

2.1 PIPE BURSTING SYSTEMS

- A. Pipe Insertion Method (PIM).
- B. TT Technology method.
- C. Tenbusch method.

- D. TRS System method.
- E. TTS300 methods.
- F. XPANDIT method.
- G. Vermeer Hammerhead mole method.
- H. Nowak Pipe Reaming InneReam method.
- I. Or Equal.

2.2 MATERIALS

A. General.

1. Same for mainline and lateral.
2. Minimum life span: 50 years.
3. Chemically resistant to internal exposure to sewage containing small quantities of hydrogen sulfide, carbon dioxide, methane, mercaptans, kerosene, moisture, and diluted sulfuric acid.
4. Chemically and physically resistant to external exposure of soil, bacteria, moisture, roots, and chemical attack due to material in surrounding ground.
5. Metal in saddles, clamps and appurtenances: 300 or 304 stainless steel following ASTM A240.
6. Elastomeric materials, gaskets, clamps, connectors: Oil resistant and manufactured following ASTM F477.
7. Select appropriate type pipe to maintain nominal inside diameter specified for each pipe segment.
8. Pipe and joints specifically designed for selected pipe bursting application.
 - a. Threaded or solvent-cement joints and connections: Not permitted.
 - b. Sectional pipe: Joint following manufacturer's recommendations and approved submittals for leak-proof stab joint method, using EPDM O-ring synthetic elastomeric gaskets.
9. Fittings.
 - a. Pressure rated and classified same as adjoining pipe.
 - b. Inside diameter to match inside diameter of adjoining pipe.
 - c. Designed for pipe bursting or pipe jacking applications.

B. HDPE pipe, joints, and fittings:

1. Polyethylene: Minimum cell classification of PE 345464C for black and PE 345464E for colors following ASTM D3350.
2. Material designation: PE 3408 following ASTM F412.
3. Hydrostatic Design Basis at 73.4 degrees F: 1,600 psi following ASTM D2837
4. Pipe.
 - a. Manufactured, sized and marked following ASTM F714.

- b. Minimum wall thickness: SDR 17.
 - c. Measure length to provide continuous, homogeneous pipe from manhole to manhole with enough extra length to allow relaxing and finishing off at manholes.
 - d. Interior Pipe color:
 - 1) Use fully bonded light-colored interior liner meeting specifications above.
 - e. Pipe Markings:
 - 1) Mark following ASTM F714.
 - 2) Legibly marked in green to identify as sewer pipe.
 - f. Approved Pipe Manufacturers.
 - 1) Performance Pipe, Division of Chevron Phillips Chemical Company, LP.
 - 2) Poly Pipe.
 - 3) Or Equal.
 - 5. Molded fittings.
 - a. Manufactured, sized and marked following ASTM D3261.
 - 6. Field fabricated fittings.
 - a. Stock manufactured, sized and marked following ASTM F714.
 - 7. Joint connection minimum requirements:
 - a. Continuous pipe.
 - 1) Assemble pipe lengths in field with butt-fused joints following ASTM D2657 and approved submittals or with electrofused joints following approved submittals.
 - a) In case of conflicts between ASTM D2657 and approved submittals or if the ASTM reference is nonspecific, follow approved submittals.
 - 2) Joint strength: Equal to or greater than pipe strength.
 - b. Excavations for pipe bursting insertion or depression removal made between manholes.
 - 1) Joint pipe ends using butt-fused joints or electrofusion coupling.
 - 2) With Engineer's approval, use full circle seal clamps specified herein or seal and restraint type mechanical couplings manufactured by:
 - a) Dresser Piping Specialties, Universal Style 90 for HDPE by HDPE, 2-inches and smaller, and Style 711 for HDPE by HDPE, 12-inches and smaller diameter pipes.
 - b) Smith-Blair, Inc., Maxi-Grip EZ for HDPE by HDPE 12-inches and smaller diameter pipes.
 - c) Or equal.
- C. Vitrified Clay Pipe (VCP) jacking pipe and fittings.
- 1. Pipe: Manufactured, sized and marked following ASTM C1208.
 - 2. Pipe, joints, and fittings: Impervious to root intrusion.
 - 3. Mainline Joints.
 - a. Mainline joining following ASTM C1208.
 - b. Designed and manufactured so loss of compression ring does not result in leakage, root intrusion or misalignment of joint.
 - c. Use polyurethane or EPDM seals.
 - d. Join plain ends of pipe using full circle elastomeric seal clamp.

4. Fitting Joints.
 - a. Following ASTM C425.
 5. Approved manufacturers:
 - a. CanClay Corporation, Denlock Jacking Pipe.
 - b. Mission Clay Products, No-Dig Microtunneling Pipe.
 - c. Or equal.
- D. Fiberglass Reinforced Polymer Pipe and Fittings and Polymer Concrete Jacking Pipe and Fittings.
1. Fiberglass Reinforced Polymer Pipe.
 - a. Manufactured, sized and marked following ASTM D3262.
 2. Polymer Concrete Pipe.
 - a. Manufactured, sized and marked following ASTM D6783.
 3. Joints.
 - a. Following ASTM D4161.
 - b. Designed and manufactured so loss of compression ring does not result in leakage, root intrusion or misalignment of joint.
 - c. Threaded joints not permitted.
 - d. Join plain ends of pipe using butt joint with laminated wrap, mechanical coupling, flange with flat face gasket, polymer molded coupling or full circle elastomeric seal clamp.
 4. Approved Manufacturers.
 - a. HOBAS Pipe.
 - b. Meyer Polycrrete Pipe.
 - c. Or Equal.
- E. Manhole Connection Materials.
1. Concrete:
 - a. High strength, non-shrink, chemical resistant.
 - b. Cures in presence of water.
 2. Approved Manufacturers of Flexible Gasket Connector.
 - a. A-Lok.
 - b. Kor-N-Seal.
 - c. Fernco.
 - d. Or Equal.
 3. Approved Manufacturers of Fused-on Waterstop.
 - a. ISCO Industries Wall Anchor.
 - b. Central Plastics Electrofusion Flex Restraint.
 - c. Or Equal.
 4. Approved Manufacturers of Hydrophobic Grout for Oakum Collar.
 - a. Avanti AV 202.
 - b. DeNeef Hydro Active Sealfoam.
 - c. Or Equal.
- F. Lateral Reconnections: Follow Contract Drawings.
1. Heat fusion or electrofusion saddles.

- a. Nominal inside diameter of existing service.
- b. Made of polyethylene pipe compound following ASTM D3350 and suitable for fusion welding to polyethylene pipe.
 - 1) Branch saddle style or approved equal.
- c. Approved manufacturers.
 - 1) Molded Branch Saddle, Performance Pipe, Division of Chevron Phillips Chemical Company, LP.
 - 2) Poly Pipe.
 - 3) Electrofusion Branch Saddle, Central Plastics Company.
 - 4) Or Equal.
- 2. Insertion connections.
 - a. Nominal inside diameter of existing service.
 - b. Approved manufacturers.
 - 1) Inserta Fittings Co.
 - 2) Or Equal.

G. Connection Appurtenances.

- 1. Use Full Circle Elastomeric Seal Clamps for joining plain ends of pipe.
 - a. Rubber sleeve coupling with stainless steel shear ring.
 - b. Follow ASTM C1173.
 - c. Approved manufacturers:
 - 1) Fernco.
 - 2) Mission Rubber Company Flex-Seal.
 - 3) DFW by NDS.
 - 4) Or Equal.
- 2. Joint lubricants.
 - a. Follow manufacturer recommendations.
 - b. Approved methods of application.
 - 1) By brush.
 - 2) By hand.

2.3 SOURCE QUALITY CONTROL

- A. Follow referenced ASTMs.

PART 3 EXECUTION

3.1 PUBLIC NOTIFICATION

- A. Following Section 02950.

3.2 MAINLINE PREPARATION

- A. Respond to project site within 2 hours of Engineer's notification of problem on site.
 - 1. Cost incurred by the Commission due to failure to respond within time frame specified may be deducted from monies owed Contractor.

- B. Bypass pumping.
 - 1. Follow Section 02960.
- C. Pre-bursting inspections.
 - 1. Perform internal inspections following Section 02956.
 - 2. Confirm, locate, and identify by building address, existing lateral connections and services attached to host sewer main. Furnish log to Engineer.
 - 3. Confirm host pipe is ready for bursting.
 - a. Demonstrate on CCTV recording:
 - 1) Realigned major sags.
 - 2) Removed obstructions, offset joints, missing or collapsed pipe that could interfere with bursting process.
 - 4. Notify Engineer if bursting is not viable with pre-inspection CCTV recording to support assertion.
- D. Pre-bursting Infiltration Leakage Measurement: Follow Section 02955.
- E. Locate and protect existing utilities following Section 01150.
- F. External point repairs prior to bursting.
 - 1. Before bursting, perform external point repair to remove sags, offset joints and bursting constrictions or obstructions that can not be removed internally, and may impede process or prevent successful completion.
 - 2. Perform work following Section 02530 except use couplings without concrete encasement or sheer bands.
- G. Maintaining invert and slope.
 - 1. Ascertain elevations of upstream and downstream manhole invert of host sewer main to be burst as well as intermediate point on mainline for verification that line and grade is maintained.
- H. Vibration monitoring equipment: Placed where necessary when directed by Engineer.

3.3 MANHOLE PREPARATION

- A. Enlarge manhole pipe openings to size sufficient to allow bursting head to pass without damaging manhole.
- B. Remove manhole drop connections that interfere with bursting process.
- C. Remove brick manhole and replace with precast manhole following Section 02530 and Standard Details.

3.4 BURSTING AND PIPE INSTALLATION

- A. Disconnect laterals from host sewer main following approved submittals.
- B. Provide access pits as required to facilitate pipe bursting insertion process.
 - 1. Locate pits where interference to vehicular traffic and inconvenience to public is minimized.
 - 2. Use sewer lateral connection locations, changes in sewer line and grade, and sags as access pit locations, and provide access to sewer from both directions.
 - 3. Prevent damage to adjacent areas during bursting process.
- C. Do not exceed approved submittal insertion rate or force at any time. Maintain logs verifying rate and force did not exceed submitted calculations.
- D. Use approved lubricant to ease installation friction. Match lubricants to soil and insertion conditions.
- E. Remove irregular internal bead projections that are not uniform and rolled-back from butt-fused joints.
- F. Extend DIP joints to remove slack in locking restrained joints.
- G. Remove and replace improperly burst sewer mains at no additional cost to the Commission.
- H. Contractor is responsible for all costs related to inaccurately located or misidentified live/active sewer lateral connections.
 - 1. Re-connect missed or active taps and abandon erroneously opened connections at no additional cost to the Commission.

3.5 RELAX PERIOD

- A. Allow inserted HDPE pipes to rest for a period of 4 hours before cutting and trimming replacement pipe or making any manhole connections.
- B. If replacement pipe exhibits retraction, at end of relax period and after flexible manhole connectors' grout has set, anchor HDPE pipe at manholes following approved submittals.
- C. After relax period, cut and trim replacement pipe 3 inches inside upstream and downstream manholes.

3.6 MANHOLE RECONNECTION

- A. Replace exterior drops with inside drops, following Standard Details.
- B. Reconnect to manhole following approved submittals.
 - 1. Restrain and seal pipe at manhole wall.

2. Use flexible gasket connector, fuse-on water stop or hydrophobic grout-soaked oakum collar embedded in concrete poured or parged across manhole wall opening.

C. Flexible gasket connector.

1. Preferred restraint and seal for precast manholes.
2. Embed flexible connector in place in manhole wall, filling all voids, front and back, for full thickness of manhole wall following Standard Details.
3. If flexible connector is not water tight, perform pipe seal with chemical grout following Section 02957.

D. Oakum Collar.

When flexible gasket connector or fused-on water stop is not used, use quick setting non-shrink concrete and embed replacement pipe with chemical grout-soaked oakum collar within manhole wall connection and add exterior bentonite collar following Standard Details.

3.7 FIELD TESTING

- A. Take V-notch weir measurement of infiltration in sewer following Section 02955 after bursting and immediately after lateral re-connections to replacement pipe, while bypass is still in place.

- B. Air test pipe following Section 02530 prior to reconnection of lateral connections.

1. Stabilize test pressures for replacement pipe at 4.0 PSIG with a minimum holding time of two minutes and maximum 0.5 PSIG pressure drop.
2. Repair or replace pipelines that fail air tests and re-test at no additional cost to the Commission.

- C. Perform post-bursting inspection of mainline following Section 02956.

3.8 RENEW LATERALS

- A. Renew laterals by pipe bursting as specified herein, within 14 days after bursting the sewer main. Follow Section 02530.

1. Pre-renewal CCTV to confirm lateral has no depressions or obstructions to prevent the bursting.
2. Laterals 20 linear feet or smaller: Pipe burst by sectional bursting.
3. Laterals over 20 linear feet: Use sectional or standard method of bursting.
4. Separate double connections.
5. Refer the following to Engineer for resolution;
 - a. Laterals with issues that prevent bursting.
 - b. Connections with less than 2 percent slope.
 - c. Connections that do not meet length requirements.

- B. Provide elevations and logs showing confirmation of lateral grade.

1. Position tap location to achieve required lateral grade without going beyond downstream property limits and without going below the four o'clock or eight o'clock positions respectively, within sewer main.
 2. Keep tap location in line with original lateral.
 3. When grade cannot be obtained within this criteria: Refer to Engineer for resolution.
- C. Install cleanout at property line. Follow Section 02955 and Standard Details.
- D. Laterals recently renewed with PVC pipe and existing cleanout: Reconnect only.
- E. Perform post-CTTV inspection of renewed lateral and mainline connection within 7 days. Follow Section 02956.
- F. Reconnect missed or active taps and abandon erroneously opened connections at no additional cost to the Commission.

3.9 RECONNECTION OF NON-RENEWED LATERALS

- A. Perform following approved submittals.
- B. Internally inspect laterals not renewed after mainline bursting following Section 02956.
1. Repair any damaged laterals at no cost to the Commission.

PART 4 MEASUREMENT AND PAYMENT

4.1 REPLACEMENT PIPE

- A. Measurement: By linear foot measured horizontally along centerline of main from center of manhole to center of manhole.
- B. Payment: At unit price for various host pipe types and sizes listed in Bid Schedule.
1. Payment includes excavation and backfill for sewer access, bypass pumping, replacement pipe, labor, materials, testing and equipment for bursting host pipe and insertion of replacement pipe, modifying manhole channel, reconnecting to manholes, finishing manholes, and restoration of manhole bench and channel.

4.2 REPLACEMENT OF MAINLINE DROP CONNECTIONSWITH INSIDE DROP

- A. Measurement: By vertical foot of drop connection measured from mainline influent invert to manhole channel invert.
- B. Payment: At unit price per foot for each size listed in Bid Schedule.
1. Payment includes all required excavation and backfill, labor, pipe materials and fittings, equipment, reconnection, replacement, and sealing following Standard Details.

4.3 RECONNECTION OF NON-RENEWED LATERALS

- A. Measurement: By each reconnection of various types and sizes of pipe.
- B. Payment: At unit price for each type listed in Bid Schedule.
 - 1. Payment includes all required excavation and backfill, labor, material, fittings, and equipment.

4.4 RECONNECTION OF RENEWED LATERALS

- A. Measurement: By each fused saddle provided.
- B. Payment: At unit price listed in Bid Schedule, or as directed by Engineer.
 - 1. Payment includes all required excavation and backfill, labor, materials, fittings and equipment.

** WSSC **