

SECTION 079
SPECIFICATIONS – TRENCHLESS PIPE REPLACEMENT SYSTEMS

Throughout these Specifications and on the project Plans, the term trenchless pipe replacement system shall include methods of pipe replacement specifically defined in this Section. Trenchless pipe replacement systems allowed to be utilized as part of the completion of the project shall be as specified on the project Plans.

Throughout these Specifications, the term pipe bursting refers to a process through which an existing pipe is replaced in situ by simultaneously breaking and displacing the existing pipe using a bursting head while pulling into place a specified replacement pipe.

The Contractor shall be responsible for determining underground conditions at and near the site(s) of the work to be performed and determining the impact of the work on existing conditions at and in proximity to the planned locations of work. Underground conditions at the site(s) of the work have not been investigated beyond any representation of existing conditions made part of the project Plans and these Specifications. The Contractor shall be responsible for determining the probability of damage to assets such as structures, utilities, etc., at and near the location(s) of work. The Contractor shall be responsible for any damage caused by pipe replacement operations or the effects thereof such as ground heave.

To determine underground conditions, the Contractor may propose to the Engineer a plan to acquire a subsurface profile using acceptable investigative means such as soil borings. If acceptable to the Engineer, such information may be gathered at the expense of the Contractor.

The Contractor shall monitor any surface displacement caused by the pipe replacement process using surveying methods acceptable to the Engineer. Information about the existing conditions including the profile of the ground surface prior to the commencement of pipe replacement operations shall be obtained using the same datum used to gather that information represented on the project Plans or another datum as provided by the Engineer. Prior to the commencement of pipe replacement operations, the Contractor shall gather information about the profile of the ground surface above the alignment of the planned pipe replacement in increments not more than ten (10) feet including the beginning and end of the planned replacement. The Contractor shall gather any additional information about the ground surface prior to the commencement of pipe replacement operations as deemed necessary by either the Contractor or the Engineer. All survey information gathered by the Contractor shall be the exclusive property of the Engineer. This information shall be compared by the Contractor and the Engineer to the same information obtained during the pipe replacement process to determine the extent of ground heave, if any.

If ground heave at the surface is detected, the Contractor shall immediately stop all pipe replacement operations and allow the Engineer time for evaluation. The Contractor shall not claim damages for delays associated with the evaluation of such data. Directions from the Engineer to abandon pipe replacement operations shall not release the Contractor from obligations to complete the work. The Engineer may order the Contractor to cease pipe replacement operations if damage or potential damage to public or private property is determined to be unacceptable. The Engineer may direct the Contractor to propose either alternative measures towards completion of the work or precautions intended to protect from damage threatened public or private property. The Contractor shall not claim damages or additional compensation for costs associated with either measures necessary to protect from damage public or private property, to correct damages caused by Contractor operations or to complete the work using alternative construction methods.

Pits, including launching and receiving pits, located along the alignment of the pipe to be replaced shall be

minimized in quantity and located to maximize the footage of pipe replaced in a single pull. The number of pit locations shall also be minimized to decrease the locations where containment of the heads and pipe is lost. The design of pits shall consider the potential overstressing of the replacement pipe in bending and shall be constructed to avoid bending the replacement pipe near its limitations as specified by the pipe manufacturer. Where possible, the Contractor shall use as pit locations the locations of necessary excavations such as sewer service reinstatements and manhole constructions. The duration that pits are open shall be kept to a minimum. The Contractor shall prepare, for the Engineer, a pit location schematic illustrating the planned pit locations and schedule for pit excavation, dewatering, backfilling and restoration. If an existing sewer structure is to be used as a receiving pit, the Contractor shall submit a plan to the Engineer detailing need modifications to the structure as well as methods and materials of repair. If the Engineer does not approve of the plan offered by the Contractor, the Contractor shall redesign the plan accordingly and resubmit a revision to the Engineer for review.

Pit locations shall consider locations of existing underground utilities to minimize service interruptions to customers. If necessary, the Contractor shall provide temporary provision for the maintenance of all utility services to customers. Unless approved by the Engineer, the Contractor shall not be allowed to disrupt any utility services to customers. The Contractor shall coordinate all utility disconnections, temporary measures for providing utility services and reconnections with the appropriate utility provider.

During the pipe replacement process, including the construction, maintenance and deconstruction of pits, the Contractor shall coordinate the protection or modification of existing utilities, whether above or below the surface of the ground, with the appropriate utility provider.

The action of the bursting or back reaming heads shall create a bore hole dimensioned sufficiently for the construction of the replacement pipe; however, the dimensions of the bore hole shall be minimized to maximize support for the replacement pipe. The maximum allowable size of the bore hole shall be 1.2 to 1.5 times the diameter of the carrier pipe. If a bored hole collapses such that bursting operations might become impossible or damaging to the replacement pipe, the Contractor shall take measures to reestablish the bored hole including, if necessary, excavation at the location of the failure.

To reduce frictional drag and tensile forces on the proposed pipe and help keep the bore hole open, bentonite or polymer lubrication muds shall be injected into the annular space behind the head. Information regarding other proposed drilling fluids shall be submitted to the Engineer for approval at least two (2) weeks before the opening of proposals. Additionally, prior to the commencement of trenchless pipe replacement operations, the Contractor shall develop a plan that details necessary measures to prevent lubrication muds from entering existing sewer services and residences; this plan shall be submitted to the Engineer for approval. Disposal of exposed drilling fluid and spoils shall be the responsibility of the Contractor and performed immediately.

If necessary, the Contractor shall be responsible for procuring a clean water supply for the purpose of completing the work.

The pipe replacement system must supply sufficient cable in one continuous length so that the replacement pipe can be constructed as specified. Pipe construction shall be continuous and without interruption from one manhole to another, as specified.

The Contractor shall provide a system of guide pulleys and bracing at each manhole to minimize winch cable contact with the existing manholes.

Using CCTV inspection and, if necessary, exploratory excavation, all sewer service connections shall be identified and located by the Contractor prior to the commencement of construction. CCTV inspections shall be performed in accordance with Section 093 of these Specifications; all inspection recordings are to be the exclusive property of the Engineer.

The Contractor shall make provisions for the collection and disposal of discharges from disconnected sewer services. Upon completion of the construction of the replacement pipe, the Contractor shall expedite the reconnection of sewer services to minimize any inconvenience to the customers.

If polyethylene (PE) pipe is used to construct the pipe, connections cannot be made to the pipe sooner than forty-eight (48) hours after release of all tension on the pipe. If the pipe manufacturer recommends a longer relaxation time, the Contractor shall comply. Connection of sewer services to the pipe shall be accomplished by sewer tapping in accordance with Subsection 3.0 of Section 031 of these Specifications.

Joints between constructed HDPE pipe and manholes shall not be completed until the expiration of the minimum relaxation period. Sufficient excess length of replacement pipe, but less than four (4) inches measured from the inside of the manhole wall, shall be allowed to protrude into adjoining manholes in consideration of the relaxation of the pipe. Following the relaxation period of the HDPE pipe, the pipe shall be trimmed to the interior face of the manhole. Additional requirements for the construction of joints between HDPE pipe constructed using pulling methods and manholes can be found in Section 027 of these Specifications and the project Plans.

Bypass pumping, if required, shall be performed in accordance with Section 093 of these Specifications.

Monitoring of the force applied directly to the replacement pipe shall be performed by the Contractor using load cells or strain gauges mounted closely behind the bursting head.

1.0 Experience Requirements

Prior to consideration for participation towards the completion of the Project, the Contractor must demonstrate to the Engineer that the Contractor has completed the construction of at least five thousand (5,000) feet of reconstruction of gravity-sanitary sewers, not including those part of a pressurized wastewater collection system, using the pipe replacement method specified on the Plans. Furthermore, only that experience in upsizing gravity sanitary sewer pipe using the proposed pipe replacement method shall be considered.

Also prior to consideration for participation towards the completion of the project, the Contractor must demonstrate to the Engineer, in the form of correspondence from the manufacturers of the pipe replacement system proposed, any necessary and proposed pipe joining system as well as the proposed HDPE joining system, that the Contractor, or an assisting subcontractor with responsibility for the construction of the proposed pipe using pipe replacement methods, as well as operators who will participate in the completion of the work, are properly trained and certified as licensed users of the equipment to the satisfaction of the manufacturers. The Contractor shall demonstrate such compliance in the form of correspondence from authorized representatives of the manufacturers to the Engineer in which the manufacturers certify that the Contractor, or subcontractor, and named operators are trained to the satisfaction of the manufacturers. Only those operators who the manufacturers of the pipe replacement and pipe joining equipment certify as sufficiently trained shall be allowed to operate the pipe replacement and pipe joining equipment.

Contractors shall submit documentation and information showing conformance with these experience and training requirements including a list of field supervisory personnel and their experience towards the completion of qualifying projects using pipe replacement methods. Information must include information

about project owners including names, addresses, telephone numbers and contact persons, the date, duration and location of work performed, information specific to the work including the length, depth, material and dimension of pipes burst and constructed as well as information about the equipment and participating Contractor personnel.

2.0 Submittals

Submittals to be provided by the Contractor to the Engineer prior to and during the performance of the work towards the completion of the Project shall include those submittals detailed throughout these Specifications as well as those below.

Prior to construction, the Contractor shall submit detail drawings and written descriptions of the proposed construction. The Contractor shall provide to the Engineer information about the proposed work including, but not limited to, excavation locations, dimensions, methods to protect public and private property, methods of dewatering, utilities that may be affected, alternative measures for collecting and properly disposing of sewage including bypass pumping and traffic control measures. The design of all aspects of the work not specified in these Specifications or in the Plans shall be the responsibility of the Contractor.

Additionally, prior to the commencement of construction, the Contractor shall provide to the Engineer construction recommendations of the manufacturers of the pipe replacement equipment, the pipe and, if applicable, the equipment used to join segments of the specified pipe. Information from the manufacturers shall include specifications and guidelines for the use of their equipment towards the completion of the work as specified on the project Plans and in accordance with these Specifications.

For all materials being used in the performance of the work, each of the Contractor's crews shall have with them at all times material safety data sheets (MSDS) for all materials in which such information is required. MSDS sheets shall be available for inspection at all times and copies shall be provided by the Contractor to the Engineer and to each fire department with jurisdiction at the locations of the work.

Limitations on pulling forces allowed during pipe replacement operations depend on the specified replacement pipe and may be specified in the project Plans. If not specified on the project Plans, the maximum allowable pulling force experienced by six (6) inch HDPE, DIPS, DR11, pipe shall be 12,000 lbs. If not specified on the project Plans or within these Specifications, the maximum allowable pulling force shall be as recommended by the manufacturer of the pipe. Prior to the commencement of construction, the Contractor shall submit to the Engineer recommended maximum pulling forces as provided by the pipe manufacturer. Manufacturer recommendations shall be provided on manufacturer letterhead, executed by an appropriate authority of the manufacturer and reference the maximum allowable pulling force for each pipe to be constructed.

3.0 Static Pipe-Bursting

Static pipe bursting shall refer to a system of pipe replacement where the force for breaking of the existing pipe comes only from a winch used to pull an expansive bursting head forward through the pipe to be replaced followed by a specified replacement pipe. The head is pulled by a winch cable that is inserted through the existing pipe and attached to the front of a bursting head. The bursting head breaks the old pipe and constructs a bored hole that provides space for the replacement pipe.

Pipe bursting shall be performed in accordance with the recommendations of the manufacturers of the pipe bursting equipment, the pipe and, if applicable, the equipment used to join segments of the specified pipe.

4.0 Pipe Reaming

Pipe reaming shall refer to a system of pipe replacement where the force for breaking of the existing pipe comes only from horizontal directional drilling equipment used to pull an expansive bursting head forward through the pipe to be replaced followed by a specified replacement pipe. A drill path is constructed that includes the insertion of a pilot drill string through the existing pipe. After, a reaming tool is attached to the drill string and the replacement pipe is attached to the reaming tool both are pulled back through the pipe. The reamer grinds and pulverizes the existing pipe while expanding the diameter of the bore hole; the fragments and excess materials are then removed and are carried with the drilling fluid to manholes or reception pits and retrieved for disposal.

Pipe reaming must be performed in accordance with the recommendations of the manufacturers of the pipe reaming equipment, the pipe and, if applicable, the equipment used to join segments of the specified pipe.

5.0 Quality Control and Assurance

At the Contractor's expense, the replacement sewer reconstructed using pipe replacement methods shall be subjected to air testing and meet the requirements of Section 039 of these Specifications. Air testing shall be performed prior to the reconnection of any sewer services.

Additionally, the replacement sewer shall be inspected by the Engineer using CCTV methods. At his expense and to the satisfaction of the Engineer, the Contractor shall be responsible for correcting any defect(s) discovered during testing and inspections.

END OF SECTION