**SECTION 3.4**

**TECHNICAL SPECIFICATION FOR SLIPLINING OF**

**WASTEWATER MAIN**

**NOVEMBER 2000**

**Part 1: General**

* 1. **Scope of work**

Furnish all materials, labor, equipment, tools, and required incidentals for the replacement of wastewater mains by Sliplining method. Sliplining is defined as the trenchless reconstruction of existing wastewater mains by subsequently inserting pipe lengths, which are joined into a continuous tube, within the bore of the existing pipe and grouting the annual spacing between the new pipe and the existing pipe.

The scope includes standards for dimensionality, testing, quality, acceptable fusion practice, safe handling, storage and installation of the pipe by sliplining.

**1.2 Pipe Description**

Unless otherwise specified in the plans and/or specifications, the following pipes or approved equal can be considered for sliplining contingent upon approval by the Owner:

* Fusible Polyvinylchloride (PVC) pipe and manufactured by Underground Solutions, Inc. or approved equal.
* Other pipeline including Reinforced Thermosetting Resin Pipe (RPRT), Reinforced Polymer Mortar Pipe (RPMP), High Density Polyethylene (HDPE), as approved by DWU.

**1.3 Related Work**

* Technical Specification for Fusible Polyvinylchloride (PVC) Wastewater Pipe
* Other related specifications as applicable

**PART 2: Quality Assurance**

* 1. **Reference Standards**
     + - This section contains references to the following documents. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those other standards are included as references under this section as if referenced directly. In the event of a conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.
       - Unless otherwise specified, references to documents shall mean the documents in effect at the time of design, bid, or construction, whichever is earliest. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.
       - Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

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| ASTM C923 | Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals |
| ASTM D1784 | Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds |
| ASTM D1785 | Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120 |
| ASTM D2152 | Test Method for Degree of Fusion of Extruded  Poly(Vinyl Chloride) (PVC) Pipe and Molded Fittings by Acetone Immersion |
| ASTM D2241 | Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR‑PR) |
| ASTM D2665 | Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings |
| ASTM D3034 | Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings |
| ASTM F477 | Elastomeric Seals (Gaskets) for Joining Plastic Pipe |
| ASTM F679 | Standard Specification for Poly(Vinyl Chloride) (PVC) Large |

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|  | Diameter Plastic Gravity Sewer Pipe and Fittings |
| ASTM F1057 | Standard Practice for Estimating the Quality of Extruded Poly (Vinyl Chloride) (PVC) Pipe by the Heat Reversion Technique |
| ASTM F1417 | Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air |

* 1. **Qualification Requirements**

2.2.1 Installer

All sliplining operations shall be performed by a qualified sliplining company who has at least three (3) years of experience involving work of a similar nature. The company must have installed a minimum of 10,000 linear feet of pipe (6-inch diameter or greater) using sliplining and supply a list of project references, prior to job commencement.

* Schedule all work through the Owner. Notify the Owner a minimum of ten (10) working days in advance of the start of work.
* Perform all work in the presence of the Owner, or his representative.
* All applicable permits and applications must be in place prior to start of work.
  + 1. Fusion Technician Requirements

If applicable, fusion technician shall be fully qualified by the pipe supplier to install fusible polyvinylchloride pipe of the type(s) and size(s) being used. Qualification shall be current as of the actual date of fusion performance on the project.

* 1. **Warranty**
* A one year warranty for the pipe shall be included from the Contractor, and shall cover the cost of replacement pipe and freight to project site, should the pipe have any defects in material or workmanship.
* In addition to the standard pipe warranty, the Sliplining contractor shall provide in writing a warranty for a period of one year for all the Sliplining work including material, installation, and pressure testing at no additional cost to the owner.
* Unless otherwise specified, the warranty periods shall begin after the Certificate of Acceptance is issued for the Contract.
  1. **Submittals**

2.4.1 Product Data

The following product data is required from the pipe supplier and/or fusion provider:

* Pipe Size,
* Wall Thickness
* Dimensionality
* Pressure Class or Pipe Stiffness per applicable standard and as shown on plans
* Color
* Recommended Minimum Bending Radius
* Recommended Maximum Safe Pull Force
* Fusion technician qualification indicating conformance with this specification
  + 1. Work Plan

The following work plan and information is required from the contractor and/or slipline installer. This work plan and information shall also be supplied to the pipe supplier, should it be requested:

* + - * Work plan shall include for each sliplining installation all excavation locations, interfering utilities, excavation dimensions, bypass pumping and traffic control schematics.
      * At least 2 weeks prior to the start of work, the Contractor shall submit its sliplining schedule identifying daily work hours and working dates for each installation.
      * Grout design mixes, installation plan, and contingency plan for the annular space grout to be used, if grout is to be used for annular space fill.

**Part 3: Product**

* 1. **Pipe**

As specified in Section 1.2 of this specification.

**3.2 PVC Gasketed Push-on Fittings**

Acceptable fittings for use with new pipe shall include standard PVC pressure fittings

conforming to applicable standards.

* Acceptable fittings for use joining new pipe other sections of fusible polyvinylchloride pipe or other sections of PVC pipe shall include gasketed PVC, push-on type couplings and fittings, including bends, tees, and couplings as shown in the drawings.
* Bends, tees and other PVC fittings shall be restrained with the use of thrust blocking or other restraint products as indicated in the construction documents.
* PVC gasketed, push-on fittings and mechanical restraints, if used, must be installed per the manufacturer’s guidelines.
  1. **Connections for Gravity Sanitary Sewer and Non-Pressure Applications**

The connections are to be used in conjunction with tie-ins to other non-pressure, gravity sewer piping and/or structures, and shall be as indicated in the construction documents or approved by the Owner.

**3.4 Grout**

* + - Grout for use as a filler of the annular space between the liner pipe and the host pipe shall be a low-density, highly flowable mix. Grout shall meet the compressive strength requirements for the installation per the contract documents.
    - Testing requirements shall be in accordance with the contract documents. Contractor may incorporate grout additives to improve its flow properties, provided that strength property requirements are met.

**3.5 Pipe Pull Heads**

* + - Pipe pull heads, if utilized, shall employ a positive through-bolt design assuring a smooth walled bolt against the pipe cross-section at all times.
    - Pipe pull heads shall be specifically designed for use with fusible polyvinylchloride pipe, and shall be as recommended by the pipe supplier.

**3.6 Pipe Rollers**

* + - Pipe rollers, if required, shall be of sufficient size to fully support the weight of the pipe during handling and pullback operations.
    - A sufficient quantity of rollers and spacing, per the pipe supplier’s guidelines shall be used to assure adequate support and resist excessive sagging of the product pipe.

**Part 4: Execution**

* 1. **Delivery and Off-Loading**
* All pipe shall be bundled or packaged in such a manner as to provide adequate protection of the ends during transportation to the site. Any pipe damaged in shipment shall be replaced as directed by the owner or engineer.
* Each pipe shipment should be inspected prior to unloading to see if the load has shifted or otherwise been damaged. Notify owner or engineer immediately if more than immaterial damage is found. Each pipe shipment should be checked for quantity and proper pipe size, color, and type.
* Pipe should be loaded, off-loaded, and otherwise handled in accordance with AWWA M23, and all of the pipe supplier’s guidelines shall be followed.
* Off-loading devices such as chains, wire rope, chokers, or other pipe handling implements that may scratch, nick, cut, or gouge the pipe are strictly prohibited.
* During removal and handling, be sure that the pipe does not strike anything. Significant impact could cause damage, particularly during cold weather.
* If appropriate unloading equipment is not available, pipe may be unloaded by removing individual pieces. Care should be taken to insure that pipe is not dropped or damaged. Pipe should be carefully lowered, not dropped, from trucks.
  1. **Handling and Storage**
     + Any length of pipe showing a crack or which has received a blow that may have caused an incident fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work. Damaged areas, or possible areas of damage may be removed by cutting out and removing the suspected incident fracture area. Limits of the acceptable length of pipe shall be determined by the owner or engineer.
     + Any scratch or gouge greater than 10% of the wall thickness will be considered significant and can be rejected unless determined acceptable by the owner or engineer.
     + Pipe lengths should be stored and placed on level ground. Pipe should be stored at the job site in the unit packaging provided by the manufacturer. Caution should be exercised to avoid compression, damage, or deformation to the ends of the pipe. The interior of the pipe, as well as all end surfaces, should be kept free from dirt and foreign matter.
     + Pipe shall be handled and supported with the use of woven fiber pipe slings or approved equal. Care shall be exercised when handling the pipe to not cut, gouge, scratch or otherwise abrade the piping in any way.
     + If pipe is to be stored for periods of 1 year or longer, the pipe should be shaded or otherwise shielded from direct sunlight. Covering of the pipe which allows for temperature build-up is strictly prohibited. Pipe should be covered with an opaque material while permitting adequate air circulation above and around the pipe as required to prevent excess heat accumulation.
     + Pipe shall be stored and stacked per the pipe supplier’s guidelines.

**4.3 Pipe Cleaning**

* + - Host pipe shall be cleaned in accordance with all applicable standards and guidelines. Unless otherwise specified, all interior pipe surfaces shall be cleaned per AWWA M28.
    - Hazardous materials shall be removed and disposed of per all applicable regulations.
    - All pipelines shall be cleaned with as many passes as necessary to create a uniform interior host pipe surface free of all loose material and sharp edges. Any potentially deleterious areas of the host pipe should be removed or secured in place, prior to the insertion of the new pipe.

**4.4 TV Inspection**

* + - The host pipe shall be inspected by TV after and possibly during the cleaning process in accordance with these specifications.
      * TV inspection after host pipe cleaning shall indicate condition of host pipe and suitability of host pipe for replacement pipe insertion.
      * Obstructions such as corporation taps, valves and valve bodies, and collapsed piping shall be remedied prior to insertion. Spot repairs shall be made in accordance with the drawings and these specifications.

**4.5 Pipe Insertion and Installation**

* + 1. Excavation and Access Pits
       - Access pit length shall be such that the minimum bending radius for the replacement pipe, per the pipe supplier is maintained. Sheeting, shoring and bracing requirements shall be in accordance with these specifications and applicable jurisdictional standards.
       - Access pit excavations shall be performed at all points where replacement pipe will be inserted into the existing pipeline. When possible, access pit excavations shall coincide with host pipe lateral connection points or other appurtenance installations.
    2. Pulling Equipment
       - The pulling mechanism shall be properly connected to the end of the newer pipe via a pulling head or arrangement approved by the pipe supplier.
       - The maximum pulling tension on the new pipe shall not exceed the pipe supplier’s safe pulling force as submitted for this project.
       - Immediately following the completion of an installation by sliplining, if possible, the pipe should be pushed back into the location of the insertion, at the pulling head, until a small amount of movement is realized at the insertion pit on the other side of the installation from the pulling equipment.
    3. Pipe Care
       - The pipe shall be handled with care to minimize the possibility of it being cut, kinked, gouged, or otherwise damaged. The use of cables or hooks will not be permitted.
       - Sections of the pipe damaged, cut, or gouged shall be repaired by cutting out the section of damaged pipe and rejoining.
  1. **Annular Space Grouting**
     + If required, the annular space between the outside of the replacement pipe and the inside of the existing host pipe shall be filled with a flowable grout in accordance with the contract documents.
     + Samples of grout shall be obtained in accordance with ASTM C495. One set of four standard cylinders shall be cast for each batch. Special handling and sampling procedures shall be followed if indicated by the grout manufacturer. The samples must meet the design compressive strength of the grout as outlined in this specification and per the grout manufacturer. Samples shall be tested in accordance with ASTM C495.
     + Grouting of the annular space shall be done in such a manner as to prevent damage, floating, or collapse of the replacement pipe. Grouting operations shall be properly vented. If the distance between grout points exceeds the Contractor's pumping capability additional grouting points shall be excavated. The replacement pipe shall not be grouted above the springline of the existing host pipe at access pits, service connections, and grouting points.
     + The replacement pipe shall be filled with water prior to the grouting procedure. This shall aid in keeping the replacement pipe from floating or collapsing during grouting operation and also aid in dissipating the heat of hydration and its effects on the new pipe as the grout cures.
  2. **Preparation Prior to Making Connections Into Existing Piping Systems or Manhole**

Approximate locations for existing piping systems are shown in the construction documents. Prior to making connections into existing piping systems, the contractor shall:

* + - * Field verify location, size, piping material, and piping system of the existing pipe.
      * Obtain all required appurtenances or wastewater fittings as shown in the construction documents.
      * Have installed all temporary pumps and/or pipes in accordance with established connection plans.
    - Unless otherwise approved, new piping systems shall be completely assembled and successfully tested prior to making connections into existing pipe systems.
  1. **Pipe System Connections**

Pipe connections shall be installed per applicable standards and regulations, as well as per the connection manufacturer’s guidelines and as indicated in the construction documents. Pipe connections to structures shall be installed per applicable standards and regulations, as well as per the connection manufacturer’s guidelines.

* 1. **Testing**

Testing shall comply with all applicable jurisdictional building codes, statutes, standards, regulations, and laws as adopted DWU.

**Part 5: Method of Measurement and Payment**

Method of Measurement and Payment for the work included in this section will be in accordance with the payment schedule in the Bid Proposal.

**\*\*END OF SECTION\*\***