Miller Pipeline Corp.

Sample Bid Specification

Revision 2

PVC Expanded-in-Place Pipeline Reconstruction

1.00 DESCRIPTION

1.01 WORK INCLUDED: This work shall include the furnishing of all labor, equipment and materials necessary to complete the reconstruction of pipelines as stipulated herein and as shown on the Contract Drawings. As applicable to this specific Contract, the work shall include the preparation of the construction site, including cleaning and flushing of existing piping; flow control bypass pumping; protection of existing conditions during installation work; unloading; hauling; distributing and installation; testing of all pipe, fittings, valves, boilers, etc. and other accessories as required for the proper installation; protection of the site during the life of the Contract, including providing of necessary warning lights, barricades, traffic control, dust control and maintenance of detours, as needed; and finally the cleanup of the work site, including maintenance of surfaces such as paving, seeding and graveling, as needed, if damaged.

1.02 INTENT OF SPECIFICATIONS: It is the intent of this Specification to provide for the reconstruction of existing pipelines by the installation of a high strength PVC expanded in place new pipe. Expansion shall be accomplished by circulating steam, or other approved method and providing pressure to properly expand the PVC pipe tight against the host pipe. After expansion, the PVC pipe shall extend over the length of the host pipe from manhole to manhole in a continuous, jointless, tight fitting, pipe-within-a-pipe. The expanded in place pipe reconstruction system shall be the EX Method as produced and manufactured by Miller Pipeline Corporation or approved equal. All requests for other products must be submitted in writing to the Engineer at least five days prior to the bid opening.

1.03 REFERENCE SPECIFICATIONS

1.03.1 ASTM

D-638	Test Method for Tensile Properties of Plastics
D-790	Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
D-1784	Specifications for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Clorinated Poly (Vinyl Chloride) (CPVC) Compounds
D-696	Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics
F-1504	Standard Specification for Folded Poly (Vinyl Chloride) (PVC) Pipe for Existing Sewer and Conduit Rehabilitation
F-1947	Standard Specification for Folded Poly (Vinyl Chloride) (PVC) Pipe for Existing Sewer and Conduit Rehabilitation.
D-2990	Standard Test Methods for Tensile, Compressive and Flexural Creep and Creep-Rupture of Plastics.

2.00 MATERIALS

The PVC pipe shall be fabricated to a size that, when installed, will neatly and tightly fit the internal circumference of the conduit. Allowance for longitudinal stretching during insertion shall be made.

The minimum length shall span the distance from inlet to the outlet of the respective pipe to be reconstructed. The Contractor shall verify the lengths in the field before starting work.

The minimum thickness for PVC pipe shall be as verified by design calculations prepared by a professional engineer for each specific pipe location.

Unless otherwise specified, the Contractor shall furnish a PVC pipe that meets ASTM Test Procedures D-638 and D-790 and the finished expanded physical strengths specified herein and ASTM F1504 Standard Specifications for Folded Poly (Vinyl Chloride) (PVC) Pipe for Existing Sewer and Conduit Rehabilitation. The product manufacturing shall

operate under quality management system such as ISO 9000:2001, or equal.

The expanded pipe shall conform to the minimum structural standards as listed below.:

Physical Characteristics	Test Procedure	Minimum Value
Tensile Strength	ASTM D-638	5,000 psi
Flexural Modulus	ASTM D-790	340,000 psi

The PVC used for the expanded in place pipe shall conform to ASTM D-1784 cell classification 12334B, or 13334B and as further defined in ASTM F-1504. Compounds that have superior properties to those specified are also acceptable.

The PVC compound shall be chemically resistant to withstand exposure to domestic sewage. For effluents other than domestic sewage, an analysis shall be performed of the waste stream to determine applicability.

The Contractor shall furnish, prior to use of the materials, satisfactory written certification of his compliance with the manufacturer's standards and specifications for all materials.

3.00 EXISTING CONDITIONS

Prior to all work, the Contractor shall carefully inspect the area for "present" existing conditions.

The Contractor shall verify all existing pipe diameters prior to ordering pipe materials.

In the event of a discrepancy, the Contractor shall immediately notify the Engineer. No work shall be performed in an area of discrepancy until it has been fully resolved by the Engineer.

4.00 SHOP DRAWINGS AND CERTIFICATIONS

After the award of the contract and before any pipe system materials are delivered to the job site, the Contractor shall submit to the Engineer a complete list of all materials proposed to be furnished and installed.

Show manufacturer's name and catalog number for each item, furnish complete catalog cuts and technical data, and furnish the manufacturer's recommendations as to the method of installation.

Upon approval of the Engineer, the manufacturer's recommendations shall become the basis for acceptance or rejection of actual methods of installation used in the work.

The Contractor shall not permit any pipe reconstruction component to be brought onto the job site until the Engineer has approved it.

No pipe shall be reconstructed without prior notification of the Engineer. Each pipe shall be subject to inspection by the Engineer immediately before it is installed and defective pipe may be rejected. Contractor shall submit to the Engineer as part of the shop drawings the manufacturer's design calculations for the minimum thickness of the pipe materials being supplied. The design calculations shall be developed based on the following parameters:

a. Existing Pipe Characteristics
    1. Assume pipe fully deteriorated
    2. Ovality equal to 2 percent

b. Soil and Ground Water Characteristics:
    1. Type of soil - clay or actual
    2. Soil density - 120 pcf or actual
    3. Soil modulus - 1000 psi or actual
    4. Ground water 2 feet below existing grade or actual

c. Long Term Reduction for Creep – Based on Manufacturers guidance, shall not exceed 50%.

d. Live Load Calculation
    1. AASHTO HS - 20 load at depths shown on plans.

The Contractor shall submit to the Engineer as part of the shop drawings a detailed resume of the field superintendent who will direct the work. The field superintendent shall have at least two-(2) year's field supervisory experience in trenchless pipeline reconstruction and a minimum of 75,000 LF of Expanded in Place PVC lining experience. The field superintendent shall be on the job full-time during any and all steps of the pipe installation.

5.00 CONSTRUCTION

The Contractor shall use all means necessary to protect pipe materials before, during and after installation and to protect the installed work and materials of all other trades.

The Contractor shall make all required connections to existing pipes and manholes and carry out such work in accordance with local standards and requirements and as directed by the Engineer. Extreme care shall be used to prevent debris from entering existing pipe prior to reconstruction.

In the event of damage caused to materials, the Contractor shall make all repairs and replacement necessary to the approval of the Engineer at no additional cost to the Owner.

The Contractor shall maintain in operating condition all active pipes encountered during the pipeline reconstruction.

The following installation procedures shall be adhered to unless otherwise approved by the Engineer:

5.01 **Safety:** The Contractor shall carry out his operations in strict accordance with all OSHA and manufacturer's safety requirements. Particular attention is drawn to those safety requirements involving steam, and entering confined spaces.

5.02 **Cleaning of sewer line:** It shall be the responsibility of the Contractor to remove all internal debris from the pipeline prior to installing the new PVC pipe. Protruding lateral connections shall be trimmed to within ½" of the pipe surface and will be paid for as additional work.

5.03 **Inspection of pipelines:** Inspection of pipelines shall be performed by experienced personnel trained in locating breaks, obstacles and service connections by closed circuit television. The interior of the pipeline shall be carefully inspected to determine the location of any condition, which may prevent proper installation of the new pipe. Defects shall be noted so that these conditions can be corrected. The Owner shall keep a videotape and suitable log for later reference.

5.04 **Bypassing flow:** The Contractor, when required, shall provide for the flow around the section of pipe designated for reconstruction. The bypass shall be made by plugging the line at an existing upstream manhole and pumping the flow into a downstream manhole or adjacent system. The pump and bypass lines shall be of adequate capacity and size to handle the flow. Once the PVC pipe has been pulled into the host pipe no flow shall be allowed to pass through that section of pipe until the PVC pipe is fully expanded.

5.05 **Line obstructions:** It shall be the responsibility of the Contractor to clear the line of obstructions or collapsed pipe that will prevent reconstruction. If inspection reveals an obstruction that cannot be removed by conventional pipe cleaning equipment, then the Contractor shall make a point repair excavation to uncover and remove or repair the obstruction. Such excavation shall be approved in writing by the Owner's representative prior to the commencement of the work and shall be considered as a separate pay item.

5.06 **Installation:** The method of installation shall be compatible with the manufacturer's recommended practices. The new pipe shall be inserted into the existing pipe through existing manholes, without modification of manholes, other than minor chipping of manhole channels or removing processing equipment. There shall be no excavation of the roadway to install "receiving" or "sending" pits, unless the length of pipe between manholes exceeds the manufacturer's

maximum coiling length technology.

5.06.1 **Preheating:** The Contractor shall supply a suitable heat source to thoroughly heat the full length of pipe to be inserted. The heat or steam used for preheating shall be monitored and regulated as recommended by the pipe manufacturer. The entire length of pipe shall be heated both internally as well as externally prior to installation.

5.06.2 **Pipe Insertion:** After the PVC pipe is heated both internally and externally, the Contractor shall pull the PVC into the existing pipe using a winch. The winch shall have sufficient capacity to pull the PVC through the host pipe without exceeding the maximum pulling tension recommended by the manufacturer. The pipe shall be heated internally during the pulling process.

5.06.3 **Expanding:** After insertion is completed, the Contractor shall supply suitable heat source. The equipment shall be capable of delivering steam through the pipe section to uniformly raise the temperature to effect forming of the PVC pipe. The steam for processing shall be monitored and regulated as recommended by the pipe manufacturer. The new pipe shall be expanded until pressed tightly against the existing pipe wall. After the PVC pipe has been fully expanded and held in that position for the required period, the steam pressure shall be replaced with air pressure cooling the pipe to 100°F or lower. After the pipe has been formed and cooled, the ends of the pipe shall be cut away at both manholes.

5.06.4 **Finish:** The finished liner pipe shall be continuous over the entire length of run between two manholes and be as free as commercially practical from visual defects such as foreign inclusions cracks, wrinkles, and pin holes. Any defects, which will affect in the foreseeable future, the integrity or strength of the new PVC pipe, shall be repaired at the Contractor's expense.

5.06.5 **Sealing at Manholes**: If, due to broken or offset pipe at the manhole wall, the pipe fails to make a tight seal, the Contractor shall apply a seal at that point. The seal shall be of a resin mixture compatible with the pipe material.

5.06.6 **Service Connections**: After the pipe has been expanded in place, the Contractor shall reconnect the existing active service connections. The Contractor shall be responsible to confirm the active laterals prior to reconnection. This shall be done without excavation from the interior of the pipeline by means of a television camera and a cutting device that re-establishes the service connections to not less than 95 percent capacity.

5.06.7 **Clean-Up:** The Contractor shall restore or replace all removed or damaged paving, curbing, sidewalks, gutters, shrubbery, fences, sod or other disturbed

surfaces or structures in a condition equal to that before the work began, to the satisfaction of the Engineer. The Contractor shall remove surplus pipe, tools and temporary structures. All dirt, rubbish and pipe material from the operation shall be legally disposed of by the Contractor.

6.00 **TESTING** When requested by the Engineer, the Contractor shall provide a pipe "coupon" specimen from each run of pipe for testing by an approved laboratory. The sample shall be taken from the ends of the pipe after installation. The Owner will pay all expenses for the testing of these specimens. The Contractor shall pay for the cost of retests made necessary by the failure of the sample specimens to meet the specified requirements. As part of the testing requirement, upon completion of the installation, a visual inspection shall be performed of the pipe expanded in place via a closed circuit television camera. DVD of the inspection shall be provided to the Owner.

7.00 WARRANTIES AND PATENTS

The Contractor shall warrant all work to be free from defects in workmanship and materials for a period of one year from the date of final completion of all construction.

The Contractor shall warrant and save harmless the Owner and his Engineer against claims for patent infringement and any loss thereof.