

CONSTRUCTION SPECIFICATION FOR
SEWER PIPELINE AND CULVERT REHABILITATION BY PVC FOLD & FORM LINER
PIPE

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XX.01 SCOPE

This specification covers the requirements for the rehabilitation of sewer pipelines and culverts by the installation of a continuous and tight fitting PVC Fold & Form (FFP/FFL) pipe/Liner (FFL). The finished liner may be installed as structural or non-structural depending on design parameters and project requirements.

Note:

Check to see if other ASTM specs exist for non-PVC F&F

XXX.01.01 Specification Significance and Use

This specification has been developed for use in provincial and municipal-oriented Contracts. The administration, testing, and payment policies, procedures, and practices reflected in this specification correspond to those used by many municipalities and the Ontario Ministry of Transportation.

Use of this specification or any other specification shall be according to the Contract Documents.

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

NOTE: This section may be removed if no appendices are included

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XXX.02 REFERENCES

When the Contract Documents indicate that provincial-oriented specifications are to be used and there is a provincial-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.PROV, unless use of a municipal-oriented specification is specified in the Contract Documents. When there is not a corresponding provincial-oriented specification, the references below shall be considered to be to the OPSS listed, unless use of a municipal-oriented specification is specified in the Contract Documents.

When the Contract Documents indicate that municipal-oriented specifications are to be used and there is a municipal-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.MUNI, unless use of a provincial-oriented specification is specified in the Contract Documents. When there is not a corresponding municipal-oriented specification, the references below shall be considered to be the OPSS listed, unless use of a provincial-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications, or publications:

Ontario Provincial Standard Specifications, Construction

- OPSS 401 Trenching, Backfilling, and Compacting
- OPSS 404 Support Systems
- OPSS 409 Closed-Circuit Television Inspection of Pipelines
- OPSS 441 Watermain Installation in Open Cut

OPSS 491 Preservation, Protection, and Reconstruction of Existing Facilities
OPSS 492 Site Restoration Following Installation of Pipelines, Utilities, and Associated Structures

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OPSS 493 Temporary Potable Water Supply Services

OPSS 517 Dewatering of Pipeline, Utility, and Associated Structure Excavation
OPSS 539 Temporary Protection Systems

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Note: May need to include if access pits are used

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GSA Standards

B64.5-07 Double-Check Valve (DCVA) Backflow Preventers
{Part of B64 Series 07, Backflow Preventers and Vacuum Breakers Compendium}

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ASTM International
ASTM International

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D 638-08 Standard Test Method for Tensile Properties of Plastics

- D 790-07e1 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
- D 2990-09 Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics
- F1871-11 ~~Folded/Formed Poly (Vinyl Chloride) Pipe Type A for Existing Sewer and Conduit Rehabilitation~~
- F1504-14 ~~Standard Specification for~~ Standard Specification for Folded Poly(Poly (Vinyl Chloride) (PVC) Pipe for Existing Sewer and Conduit Rehabilitation
- F1867-06 Standard Practice for Installation of Folded/Formed Poly (Vinyl Chloride) (PVC) Pipe Type A for Existing Sewer and Conduit Rehabilitation
- F1947-10 Standard Practice for Installation of Folded Poly (Vinyl Chloride) (PVC) Pipe into Existing Sewers and Conduits
- ~~F 1216-09 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin Impregnated Tube~~
- ~~F 1743-08 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP)~~

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NSF International

~~61-2008 Drinking Water System Components—Health Effects~~

American Water Works Association (AWWA)

~~C510-07 Double-Check Valve Backflow Prevention Assembly~~

XXX.03 DEFINITIONS

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For the purpose of this specification, the following definitions apply:

PVC Fold & Form Lining means the rehabilitation of gravity sewers and culverts ~~and watermains~~ by installation of a PVC Fold & Form Liner/pipe system within an existing pipe.

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~~**NOTE: Feedback from Frank and Kamran, re: whether to include watermain (and applicable standards)**~~

Structural Liner means a liner that does not require assistance from the host pipe to support external loads.

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Non-Structural Liner means a liner that does require assistance from the host pipe to support external loads.

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Engineer means a professional engineer licensed by the Professional Engineers Ontario to practice engineering in the Province of Ontario.

~~Resin means a general purpose, unsaturated, styrene based, thermoset resin and catalyst system or an epoxy resin and hardener that is compatible with the inversion process.~~

XXX.04 DESIGN AND SUBMISSION REQUIREMENTS

XXX.04.01 Design Requirements

The engineering design shall be in accordance with ASTM F 1867 or ASTM F1947 with the following criteria:

a) Design conditions:

- i. PVC Fold & Form design shall assume partially or fully deteriorated condition of the original pipe.
- ii. PVC Fold & Form design shall assume no bonding to the original pipe wall.

~~NOTE: Feedback from Frank and Kamran, re: whether to include both partially and fully deteriorated conditions~~

b) Parameters for design:

- i. Minimum design life of 50 years.
- ii. Safety factor of 2 on external loads.
- iii. Groundwater depth is full soil depth, unless otherwise known.
- iv. Soil modulus of 4.8 MPa, unless otherwise known.
- v. Soil density of 1925 kg/m³, unless otherwise known.
- vi. Live load is Highway H-20 loading of 110 MPa.
- vii. Ovality no greater than 5%. (NOTE: for discussion; change ovality (10%? Or higher) or eliminate??)
- viii. Long term flexural modulus.

~~NOTE: END OF JAN 29th meeting~~

~~Pipe Tube installation forces or pressures shall be limited so as not to stretch the tube longitudinally by more than 5% of the original length.~~

~~The flexible linertube shall be fabricated to a size that neatly fits the internal circumference of the host pipe. Allowance shall be made for circumferential stretching during insertion.~~

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XXX.04.02 Submission Requirements

~~The design~~Shop Drawings for the lining shall be submitted to the Contract Administrator for approval 14 Days prior to installation. The design flow calculations shall show technical assumptions, identify the design formulas used, ~~and show the wall thickness~~ and show minimum finished inside diameter. The ovality condition used in the calculations shall be within manufacturer's tolerance for the liner product identified.

~~The engineering design~~Shop Drawings shall graphically illustrate the installation conditions (i.e., depth of pipeline, water table, pipe invert and crown, and full details of the parameters used).

The design submission work shall bear the seal and signature of a Professional Engineer licensed to practice engineering in the province of Ontario.

The following information shall be submitted to the Contract Administrator 7 Days prior to commencing Work:

- a) A work plan outlining the schedule, procedures, and work site.
- b) A list of personnel, including backup personnel, with their qualifications and experience.
- c) A traffic control plan.
- d) Safety plan, including the company safety manual and emergency procedures.
- e) Product by-pass or temporary supply system plans, including methods, with a list of equipment to be used.
- f) Manufacturer's technical data containing complete information on:
 - i. Material composition, physical properties, and dimensions of the new product.
 - ii. Recommendations for transportation, handling, and storage.
 - iii. Repair of product damaged during installation.
 - iv. Installation and connection details.
 - v. Processing ~~Inversion~~ pressures.
 - vi. Product post-processing ~~curing~~ procedures listing the temperature and duration, including cool down time for the product.
- g) Contingency plans for the following potential conditions:
 - i. Damage to the existing service connections.
 - ii. Improper placement of the PVC Fold & Form Liner ~~CIPP~~.
 - iii. Damage to the host pipe.

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iv. The ~~liner's PVC Fold & Form's CIPP's~~ failure to achieve structural integrity.

A sample letter to residents impacted by the work shall be submitted to the Contract Administrator for approval 7 Days prior to commencing the work.

XXX.05 MATERIALS

XXX.05.01 Liner

The ~~PVC Fold & Form L~~iner material shall have the following minimum physical properties~~characteristics~~:

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a) Initial Structural Properties of the Lining

- i. Flexural strength ~~of 28 MPa 31 MPa~~ according to ASTM D-790.
- ii. Flexural modulus ~~of 1,000 MPa 1,724 MPa~~ according to ASTM D-790.
- iii. Tensile strength ~~of 25 MPa 21 MPa~~ according to ASTM D-638.
- iv. 50-year creep reduction ~~as per based on 50%+ according~~ ASTM D-2990.

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b) Material Properties for Pipelines

~~The finished CIPP liner shall meet the chemical resistance requirements in accordance with ASTM F 1216 and shall be resistant to all chemicals and agents found in the water supply.~~

~~For PVC Fold & Form liners installed in watermains, the liner shall be NSF/ANSI 61 compliant.~~

XXX.05.02 Tube

~~The CIPP tube shall consist of one or more layers of flexible needled felt or an equivalent non-woven material capable of carrying resin able to withstand installation pressures and curing temperatures and shall be compatible with the resin system used. The material shall be capable of stretching to fit irregular pipe sections and negotiate bends. The inner layer and the finished pipe surface shall have an impermeable plastic coating for enhancement of corrosion protection, flow, and abrasion properties of the liner. The tube shall be fabricated to a size that fits tightly to the internal circumference and the length of the original conduit, when installed.~~

~~The tube shall be marked at regular intervals not to exceed 1.5 m along its entire length with the manufacturer's name or identification symbol.~~

~~XXX.05.03 — Resin~~

~~The CIPP resin shall meet the requirements of ASTM F 1216.~~

~~XXX.05.04 — Calibration Hose~~

~~If a calibration hose is used for inflation of the CIPP liner system, it shall comply with the requirements of ASTM F 1743.~~

~~XXX.05.05 — Lubricant~~

~~The lubricant used shall be a non-toxic oil-based product that has no detrimental effects on the tube or boiler and pump system, does not support the growth of bacteria, and does not adversely affect the fluid to be transported. Lubricant shall not be used in processes with permeable coatings.~~

~~XXX.05.06 — Double Check Valve Backflow Preventers~~

~~Double check valve backflow preventers shall be according to CSA B64.5 or AWWA C510.~~

XXX.07 CONSTRUCTION

XXX.07.01 General

The Contract Administrator shall be notified at least 48 hours in advance of starting work.

The Contractor shall confirm the exact size and length of all existing pipes to be rehabilitated prior to installation. ~~undertaking the manufacturing of any tubes.~~

All required equipment shall be on-site and in satisfactory working order prior to commencing the installation of a lining section.

Work shall progress and continue as required to minimize downtime on pipelines and out-of-service periods on laterals.

At least 7 Days prior to any interruption in service, the Contractor shall advise, in writing, all residents who may be affected by the rehabilitation process about the nature, duration, and expected date of any interruption in service and the contact information of the Contractor. The Contractor shall notify all affected residents or businesses of the specific time of the disruption to their service at least 24 hours in advance and shall endeavour to minimize their inconvenience. During the course of the rehabilitation and any associated service interruption, the residents shall be kept regularly informed regarding any matters that affect them. When the interruption has ended, residents shall be advised immediately either verbally or in writing.

The Contractor shall carry out testing as specified in the Contract Documents to confirm that each service connection is live.

XXX.07.02 Preservation and Protection of Existing Facilities

Preservation and protection of existing facilities shall be according to OPSS 491.

XXX.07.03 Transporting, Unloading, Storing, and Handling Materials

Manufacturer's recommendations for transporting, unloading, storing, and handling of materials shall be followed.

XXX.07.04 Trenching, Backfilling, and Compacting

Trenching, backfilling, and compacting for any access pits shall be according to OPSS 401.

XXX.07.05 Support Systems

Support systems shall be according to OPSS 404.

XXX.07.06 Dewatering

Dewatering shall be according to OPSS 517.

XXX.07.07 Temporary Protection Systems

The construction of temporary protection systems shall be according to OPSS 539.

Where the stability, safety, or function of an existing roadway, railway, watercourse, other works, or proposed works may be impaired due to the method of operation, protection shall be provided. Protection may include sheathing, shoring, and piling where necessary to prevent damage to such works or proposed works.

XXX.07.08 Temporary Service

XXX.07.08.01 Sewer Lining, By-Pass of Flow for Sewers

When specified in the Contract Documents, during the execution of the work, the sewer flow shall be by-passed around the pipeline being relined.

Pumps and by-pass lines shall be of adequate capacity and size to handle all flows.

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When interruption of sewer line flows is necessary to properly conduct the inspection and rehabilitation operations, acceptable methods of flow control shall be used. The Contractor is to make all necessary arrangements with the owners, property managers, and residents of each building. The Contractor shall contact all property owners or tenants or both to coordinate the repair work to the sewer and minimize any impact to the residents and businesses.

During the inspection and rehabilitation, sewer flows shall be shut off in order to enable proper inspection of the pipe invert. After the work is completed, flows shall be restored to normal.

On all liner installation dates, the Contractor shall maintain a primary and stand-by by-pass pump and pump power supply on-site. Sufficient power supply and hoses shall be on-site in order to allow the pump to discharge into the next downstream sewer section. The stand-by by-pass pump and power supply shall be of an equal or better capability than the primary by-pass pump and power supply. No by-pass pumps or related equipment shall be disconnected or removed from the sewer or work site until after all service connections have been reinstated and the Contractor has recorded the post-installation video.

All by-pass pumping shall be in place and operational prior to the final pre-installation inspection. All by-pass pumping capacities and configurations shall be approved by the Contract Administrator prior to the actual liner installation date. When specified in the Contract Documents, all by-pass pumps and related equipment shall be silenced equipment or contained within an acceptable sound reduction structure.

~~XXX.07.08.02 Watermain Lining, Temporary Potable Water Supply Services~~

~~Temporary potable water supply services shall be according to OPSS 493.~~

XXX.07.09 Preparation of Existing Pipeline

A pre-installation inspection shall be completed in the presence of the Contract Administrator prior to the commencement of the pipeline rehabilitation.

The existing pipeline to be rehabilitated shall be prepared in accordance with the manufacturer's requirements for PVC Fold & Form Liner installation. Debris, grease, and other deposits shall be removed from the pipeline. Any obstructions remaining after flushing and cleaning shall be removed without damaging the existing pipeline walls. All roots that interfere with the lining installation shall be removed. Any calcite build-up in the existing pipeline that interferes with the PVC Fold & Form Liner shall be removed by means that do not damage the existing pipeline walls. Protrusions from deposits such as calcite shall not exceed 6 mm.

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Existing service laterals that protrude more than 6 mm into the pipeline shall be removed without damage to the lateral or the pipeline wall. Flail type equipment is not permitted for the removal of protruding laterals.

The Contractor shall also install a screen in the downstream maintenance hole in order to catch any material, including cut outs from service connection openings that may migrate downstream. Such material shall be removed from the maintenance hole.

If the pre-installation inspection reveals an obstruction such as a protruding service connection, a dropped joint, or a collapse that prevents the lining inversion process and it cannot be removed by conventional sewer cleaning equipment, then the Contractor shall attempt a trenchless technique to remove or repair the obstruction. Any necessary excavation shall be approved in writing by the Contract Administrator prior to the commencement of the work.

When the filling of voids is necessary to ensure structural integrity of the pipeline and to prevent bridging of the liner, the Contractor shall submit a detailed procedure outlining the process and materials to be used to fill the voids to the Contract Administrator for approval.

XXX.07.10 Access Pits

When possible, ~~existing valve and fitting locations or~~ existing maintenance holes shall be used as access pit locations. Access pit locations shall be approved by the Contract Administrator prior to the beginning of construction.

~~When an access pit is to be located in close proximity to a closed live watermain valve, the active thrust force of the valve shall be addressed to prevent dislocation of the valve or adjacent piping and to ensure safe working conditions.~~

~~XXX.07.11 Replacement of Valves~~

~~For watermains, all valves along the length of pipe to be lined shall be removed and replaced with the type and size of valve specified in the Contract Documents. In all cases, a jumper wire shall be thermite welded to the existing cast or ductile iron pipe on both sides of the replaced valve.~~

XXX.07.12 Closed-Circuit Television (CCTV) Inspection

CCTV inspection shall be according to OPSS 409.

Two CCTV inspections of each pipeline section shall be completed as follows:

a) Post Preparation Video Inspection

After completion of the preparation of a pipeline section, a video inspection of the full length of the pipeline section shall be made and submitted to the Contract

Administrator. Prior to the delivery of the 24-hour service interruption notice and any lining installation taking place, approval of the prepared section shall be obtained from the Contract Administrator.

b) Post-Lining Final Video Inspection of Complete Rehabilitation

After completion of all work required for the lining of the pipeline section, a video inspection of the full length of the pipeline section shall be made and submitted to the Contract Administrator for approval of the work.

The final video recording shall be submitted to the Contract Administrator for approval immediately upon completion of the work, but no more than 48 hours after the lining installation in each section.

The inside wall of the access point at each end of the pipeline section shall be clearly visible on the inspection videotape.

XXX.07.13 PVC Fold & Form Lining Installation

The installation of the PVC Fold & Form ~~Liner~~ Linerlining shall be according to the manufacturer's ~~recommendations~~ procedure.

Before installation begins, the Contractor shall obtain manufacturer's recommendations ~~for of~~ the minimum pressure required to hold the tube tight against the existing pipes and the maximum allowable pressure, so as not to damage the existing pipe. Once the installation has started, pressure shall be maintained between the minimum and maximum pressures until the installation has been completed.

The existing pipes shall be dewatered prior to installation ~~for any CIPP installation that does not use an inversion method to expand the tube against the pipe wall.~~

XXX.07.14 Processing Curing

The PVC Fold & Form ~~L~~ liner installation shall be according to ASTM F1867 or F1947. Qualified personnel shall monitor the processing phase ~~curing process~~ and maintain written records, including boiler monitor graphs, water temperatures, and lining temperatures, and water head throughout the curing process. These records shall be made available to the Contract Administrator upon request.

The PVC Fold & Form ~~L~~ liner shall be inserted and ~~processed cured~~ in accordance with the manufacturer's parameters and procedures required for the process.

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~~Readings shall be made and recorded at 30-minute intervals of:~~

- ~~a) the boiler water, temperature in.~~
- ~~b) the boiler water, temperature out.~~

~~Liner external surface temperatures at access points shall be measured using thermocouples. Thermocouples shall be placed at the invert level at the remote end of the repair to determine temperature at this location during the processing curing cycle.~~

The time required for the processing shall be determined by the temperature monitoring and shall be adjusted to suit the lengths, diameter, thickness, field conditions, and ambient temperature applicable to each pipe lining section.

~~Leakage testing of the CIPP shall be conducted during the cure while under hydrostatic pressure.~~

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XXX.07.15 Cool-Down

~~The PVC Fold & Form Liner CIPP shall be cooled to a temperature below 38 °C before relieving the pressure. Cool-down may be accomplished by the introduction of air cool water into the PVC Fold & Form Liner CIPP to replace steam used during processing. water being drained from a small hole made in the down stream end. Care should be taken in the release of the static head so that a vacuum does not develop that could damage the newly installed CIPP.~~

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~~Prior to releasing the water used for curing the liner, the water shall be cooled to the ambient temperature of the sewer into which it is to drain.~~

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XXX.07.16 Inflation Plug Bladder Removal

~~For pulled in place installation techniques—Once processing and cool-down have been completed bladder is designed to not bond to the CIPP, all portions of the inflation plugs bladder material shall be removed from the CIPP.~~

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XXX.07.17 Liner Termination

The liner termination at and through sections shall be neat and free of obstructions. If the liner termination fails to make a watertight seal with the existing pipe, a seal shall be applied at this point. ~~The sealing process shall use a material compatible with the liner pipe.~~

In the case where the liner is installed through an existing maintenance hole, the liner shall be trimmed neatly and parged ~~at the spring line of the liner and~~ at the interface between the liner and any other existing sewers or service connections entering into the maintenance hole.

XXX.07.18 Testing

When specified in the Contract Documents, testing shall be in accordance with the requirements of ASTM F1867 or ASTM F1947 ~~F 1216~~. A sample shall be taken from the processed ~~cured~~ liner obvert at an access point, sufficient in size to meet the requirements of ASTM D 790. The testing of the sample shall be done by an independent testing laboratory approved by the Contract Administrator.

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a) Finished Liner

~~When required,~~ for each section of lining, the Contractor shall provide to the Contract Administrator a cylindrical sample of the lining of at least 200 mm in length. The sample shall be taken from lining that extends into an access point on the section. A suitable form shall be used to create the sample so that the conditions of making the sample are as close as possible to the installation and ~~processing~~ curing conditions for the corresponding section of pipe being lined.

~~PVC Fold & Form CIPP~~ samples shall be prepared and physical properties tested in accordance with ASTM F1867 or ASTM F1947 ~~ASTM F 1216~~.

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~~Leakage testing of the CIPP shall be accomplished during cure while under a positive head. CIPP products in which the pipe wall is cured while not in direct contact with the pressurizing fluid, such as removable bladder, shall be tested by an alternative method approved by the Contract Administrator.~~

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Visual inspection of the PVC Fold & Form liner ~~CIPP~~ shall be in accordance with ASTM F1867 or ASTM F1947 ~~ASTM F 1216~~.

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b) Resin

~~The Contractor shall supply a sample of the resin from each liner supplied, when requested by the Contract Administrator.~~

~~The layers of the cured CIPP shall be uniformly bonded. It shall be impossible to separate any two layers with a probe or point of a knife blade so that the layers separate cleanly with the probe or knife blade moving freely between the layers. If separation of the layers occurs during testing of field samples, new samples shall be cut from the work. Any reoccurrence may cause rejection of the work.~~

~~XXX.07.19 — Flushing and Disinfecting~~

~~The PVC Fold & Form CIPP liner for watermains shall be flushed and disinfected according to OPSS 441, prior to its use.~~

XXX.07.20 Service Connections and Lateral Reinstatements

Service connection and lateral reinstatement shall be made internally with appropriate remotely operated equipment. Excavation of connections or laterals shall not be allowed. Restored connection or lateral openings shall be cut neatly to full size without over-cutting. Cuts shall be smooth and without residual material left around the opening. Ragged edges or attached material shall not be allowed.

When sewer lateral flow has been interrupted, reinstatement of the lateral shall proceed urgently and with all possible speed to restore lateral flow. Laterals may be reinstated using an initial opening sufficient to restore flow, followed by completion to full reinstatement of 100% open within 24 hours.

~~XXX.07.21 — Return of Watermain to Service and Removal of Temporary Potable Water Supply System~~

~~Upon receipt of satisfactory test results on water samples, the watermain shall be flushed and returned to service, permanent water service connections restored, excavations backfilled, and the temporary service lines removed without interruption of the water supply.~~

XXX.07.22 Site Restoration

Site restoration shall be according to OPSS 492.

XXX.07.23 Management of Excess Material

Management of excess material shall be as specified in the Contract Documents.

XXX.09 MEASUREMENT FOR PAYMENT

XXX.09.01 Actual Measurement

XXX.09.01.01 Product Installation

Measurement for a product installation shall be by length in metres along the horizontal centreline of the product between connecting points or, if there is no connecting point, to the end of the product.

When the connecting point is a structure, measurement for a product installation shall be in metres to the centre of the structure.

XXX.09.01.02 ~~Service Connection/Lateral Reinstatement~~

For measurement purposes, a count shall be made of the number of ~~service~~ connections made to the new product.

XXX.09.02 Plan Quantity Measurement

When payment is by Plan Quantity, such measurement shall be based on the units shown in the clauses under Actual Measurement.

XXX.10 BASIS OF PAYMENT

XXX.10.01 Product Installation, "type, diameter, or use of product" - Item

~~Service Connection/Lateral Reinstatement - Item~~

Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Material to do the work.

No extra payment shall be made for costs associated with the control of flow for sewers.

Any extraction of ~~reaming~~ tools or ~~other~~ equipment, including extraction by excavation, shall be the responsibility of the Contractor and shall be done at no extra cost to the Owner.

Costs associated with the filling of identified voids shall be as specified in the Contract Documents. Any additional work done for the filling of additional voids identified in the video inspection shall be paid as Extra Work. Filling of voids occurring as a result of Contractor's operations shall be done at no extra cost to the Owner.

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XXX.10.02 Closed-Circuit Television Inspection

When the Contract does not contain a separate tender item for CCTV inspection, the Contract price for product installation shall include full compensation for all labour, ~~E~~quipment, and ~~M~~aterial to do the work of CCTV Inspection.

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