

FLEXIBLE PIPE SEWER (75 Year DSL) - Item No.
FLEXIBLE PIPE SEWER (50 Year DSL) - Item No.
FLEXIBLE PIPE SEWER (25 Year DSL) - Item No.
RIGID PIPE SEWER (75 Year DSL) – Item No.
RIGID PIPE SEWER (50 Year DSL) – Item No.
RIGID PIPE SEWER (25 Year DSL) – Item No.

Special Provision No. 406S01

July 2007

MTC Form 406, August 1982, Construction Specification for Pipe Sewer Construction By Open Cut Method is amended as follows:

406.01 SCOPE

Section 406.01 of MTC Form 406, August 1982, is deleted and replaced with the following:

This specification covers the requirements for the installation of pipe sewers in open cut and includes the requirements for excavation, bedding and backfilling for the pipe.

406.02 REFERENCES

Section 406.02 of MTC Form 406, August 1982, is amended by the addition of the following references:

Ontario Provincial Standards Specifications, Construction:

OPSS 501 - Compacting
OPSS 517 – Dewatering
OPSS 538 – Shoring and Bracing
OPSS 539 – Protection Systems
OPSS 904 - Concrete Structures

Ontario Provincial Standards Specifications, Material:

OPSS 1010 - Aggregates - Base, Subbase, Select Subgrade and Backfill Material
OPSS 1302 - Water
OPSS 1801 - Corrugated Steel Pipe
OPSS 1820 - Concrete Pipe
OPSS 1840 - Polyethylene Pipe
OPSS 1841 - Polyvinyl Chloride Pipe Products

American Society for Testing and Materials:

ASTM A760M-90 - Standard Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains
ASTM F894 – Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe

406.03 DEFINITIONS

Section 406.03 of MTC Form 406, August 1982, is deleted and replaced with the following:

Backfilling means the operation of filling the trench with bedding, cover, and backfill material or embedment and backfill material.

Backfill Material means fill material used above the embedment or cover material and below the lower of the subgrade or finished grade or the original ground.

Bedding Material means the material used to support the pipe.

Concrete Appurtenances mean concrete head walls, cut-off walls, stiffeners, aprons, collars and any other concrete fixtures associated with the pipe sewer excluding concrete bedding or concrete structures covered elsewhere in the Contract and specified as such.

Cover Material means the material placed from the top of the bedding to the bottom of the backfill.

Design Service Life (DSL) means the minimum number of years of relatively maintenance-free performance that a material has to meet or exceed for a particular sewer.

Embedment Material means material as it relates to flexible pipe, from the bottom of the bedding to the bottom of the backfill.

Excavation, Earth and Rock means the excavation classified as earth and rock according to OPSS 206.

Flexible Pipe Sewer means a pipe sewer constructed with corrugated inside wall pipes.

Native Material means the material removed to form an excavation within the work area for return to the same or other excavation.

Pipe Sewer means an installation designed for the conveyance of sanitary sewage or storm water using preformed or precast pipe sections, circular or non-circular in cross section, laid end to end using suitable jointing material and connected by maintenance holes for sanitary sewers and by maintenance holes, catch basins; ditch inlets or other appurtenances for storm sewers.

Rigid Pipe Sewer means a pipe sewer constructed with smooth inside wall pipes.

406.05 MATERIALS

406.05.04 Sewer Pipe

Subsection 406.05.04 of MTC Form 406, August 1982, is deleted and replaced with the following:

Pipe type and class shall be selected according to the terms of the Contract

Sewer pipe material selection shall satisfy the DSL criteria as specified in the Contract. All pipes, couplings and fittings shall be according to the applicable material specifications as follows:

406.05.04.01 Concrete Pipe Products

Concrete pipe products are suitable for 75, 50 or 25-year DSL applications and shall be according to OPSS 1820.

406.05.04.02 Steel Pipe Products

Steel pipe products shall include structural plate pipe (SPP) with a plain galvanized coating or corrugated steel pipe (CSP) and spiral rib steel pipe (SRSP) that can have a plain galvanized, aluminized Type II or polymer laminated coating.

The corrugations for CSP, SRSP and SPP shall be selected from the appropriate height of fill table in the Contract.

The wall thickness for steel pipe products shall be selected as the greater from of that determined by:

- a. The appropriate height of fill table in the Contract; or
- b. Table 2: Minimum Wall Thickness/Acceptable Pipe Product-Coating Type-DSL.

Table 2: Acceptable Pipe Product/Minimum Wall Thickness-Coating Type-DSL

Pipe Coating Type	DSL					
	75 years		50 years		25 years	
	Acceptable Pipe Product	Minimum Wall Thickness	Acceptable Pipe Product	Minimum Wall Thickness	Acceptable Pipe Product	Minimum Wall Thickness
Plain Galvanized	SPP	6.0 mm	SPP	4.0 mm	CSP SRSP SPP	2.0 mm 2.0 mm 3.0 mm
Aluminized Type II	Not permitted	Not permitted	CSP SRSP	2.0 mm 2.0 mm	CSP SRSP	1.6 mm 1.6 mm
Polymer Laminated	CSP SRSP	2.0 mm 2.0 mm	CSP SRSP	1.6 mm 1.6 mm	CSP SRSP	1.6 mm 1.6 mm

Note:

- 1) Where the required diameter of pipe product is not available with a wall thickness as specified by the appropriate height of fill table or in Table 2, the next greater wall thickness available for that pipe diameter shall be selected.

Structural plate, corrugated and spiral rib steel pipe products shall be according to OPSS 1801.

406.05.04.03 Plastic Pipe Products

Plastic pipe products shall include polyvinyl chloride (PVC) and high-density polyethylene (HDPE) pipe material. PVC pipe can have a smooth wall both inside and outside (SIO) or a smooth inside wall with a ribbed outside wall (SIRO). HDPE pipe can have a smooth inside wall with a corrugated outside wall (SICO) or a smooth inside and outside wall (SIO) or have a corrugated wall both inside and outside (CIO). The pipe products supplied shall not contain reprocessed or recycled materials.

The pipe class shall be selected as the greater from that determined by:

- a. The appropriate height of fill table in the Contract; or
- b. Table 3: Class-Pipe Product-DSL.

Table 3: Class-Pipe Product-DSL

Pipe Product		DSL		
		75 years	50 years	25 years
HDPE	SICO	Class 320	Class 210	Class 210
	CIO	Class 320	Class 210	Class 210
	SIO	RSC 250	RSC 160	RSC 160
PVC	SIO	Class 320	Class 210	Class 210
	SIRO	Class 320	Class 320	Class 320

Note:

- 1) Where the required diameter of pipe product is not produced with a class as specified from the appropriate height of fill table or from Table 3, only a greater class for that pipe diameter is acceptable.

Polyethylene pipe products shall be according to OPSS 1840. References to CAN/CSA-B182.6 in OPSS 1840 shall be deemed to reference both CAN/CSA-B182.6-02 and CAN/CSA-B182.8-02.

Polyvinyl chloride pipe products shall be according to OPSS 1841.

406.05.05 Mortar

Subsection 406.05.05 of MTC Form 406, August 1982, is deleted and replaced with the following:

The normal portland cement shall meet the requirements of OPSS 1301 and the mortar sand shall be according to OPSS 1004.

Section 406.05 of MTC Form 406, August 1982, is amended by the addition of the following subsections:

406.05.06 Bedding Material

Bedding material shall be granular, 25 mm or less in size, or concrete or as specified elsewhere in the Contract Documents.

406.05.07 Embedment Material

Embedment material shall be homogeneous granular, 25 mm or less in size, or as specified elsewhere in the Contract Documents.

406.05.08 Cover Material

Cover material shall be native material, which is free of boulders over 150 mm, topsoil, and other deleterious material; or granular material, 25 mm or less in size; or as specified elsewhere in the Contract Documents.

406.05.09 Granular Material

Granular material shall be according to OPSS 1010.

406.05.10 Backfill

Backfill shall be native material, which is free of boulders over 150 mm, topsoil, and other deleterious material; or granular material, 25 mm or less in size; or as specified elsewhere in the Contract Documents.

Rock fill, surplus to the requirements of the Contract, can be used provided that the pipe is protected by a minimum of cover or embedment material, dependent on the pipe installed, as specified in the Contract Documents.

406.07 CONSTRUCTION

Section 406.07 of MTC Form 406, August 1982, is deleted and replaced with the following:

406.07.01 Selection of Pipe

406.07.01.01 Size of Pipe

The diameter of the pipe shall be the size specified in the Contract. The trench width for the purpose of pipe sewer excavation and granular backfill shall be the maximum allowable width specified in the Contract for the specified pipe sewer diameter.

406.07.01.02 Type of Pipe

Sewer pipe shall be the type specified in the Contract.

When a flexible pipe sewer is specified, the Contractor may only select pipe with a corrugated inside wall. When a rigid pipe sewer is specified, the Contractor may only select pipe with a smooth inside wall.

If the Contractor chooses to install concrete pipe product, the bedding for that pipe shall be constructed according to the contract requirements for rigid pipe. All other pipe products shall be constructed according to the contract requirements for the appropriate flexible pipe.

406.07.02 Excavation

406.07.02.01 General

The excavation for the installation of the pipe sewer shall be in accordance with the details shown in the Contract. The Contractor shall be responsible for the excavation of the trench within the width, grade and alignment specified in the Contract. The variation in invert elevation shall not exceed plus or minus 150 mm and any change within this limit shall not constitute a change in the scope of the work specified in the contract documents. Bedding elevation shall be adjusted according to the invert level.

406.07.02.02 Over Excavation For Pipe Sewers

Where excavation exceeds the allowable trench width specified in the Contract, the Contractor shall be responsible for providing a structurally stronger pipe or a higher class of bedding or both, applicable to the revised trench width. Any expenses resulting from these changes shall be borne by the Contractor at no additional cost to the Owner.

406.07.02.03 Management of Excavated Material

Excavated material not designated to be incorporated as backfill or cover material at the sewer location shall be managed as specified elsewhere in the Contract.

406.07.02.04 Dewatering

Where dewatering is required for the installation of pipe sewer, it shall comply with the requirements of OPSS 517.

406.07.02.05 Shoring and Bracing

Where, due to the nature of the work the Contractor shores or braces the excavation during the construction of the work, the Contractor shall carry out the work according to OPSS 538.

406.07.02.06 Protection Systems

The construction of all protection systems shall be according to OPSS 539. Where the stability, safety or function of an existing roadway, railway, other works, or proposed works may be impaired due to the method of operation, such protection as may be required shall be provided.

406.07.03 Pipe Bedding

406.07.03.01 General

The bedding shall be of the type and class specified in the contract documents, and the bedding material shall not be placed on a frozen grade. Where bedding requires compaction, the bedding material shall be compacted to the density requirements of OPSS 501. Bedding on each side of the sewer pipe shall be compacted simultaneously. At no time shall the levels on each side differ by more than 200 mm loose.

Where unwatering is required, the work shall be according to OPSS 902

406.07.03.02 Granular Bedding

Where required, the bedding material shall be shaped to the dimensions shown in the contract and compacted according to OPSS 501.

406.07.03.03 Concrete Bedding

The Contractor shall ensure that the external surface of the pipe is thoroughly cleaned before placing concrete and no movement of the pipe occurs during placing of concrete.

When bedding is placed in two pours, the Contractor shall ensure that the level of the first pour is not higher than 75mm below the bottom of the pipe, and cured for a minimum of 24 hours before placing the second pour.

The Contractor shall place a bond breaking material between the concrete and the sheathing, where sheathing is required or used for the excavation.

406.07.04 Pipe Installation

406.07.04.01 General

Installation of the sewer pipe shall be according to the grade and alignment as detailed in the Contract.

The trench shall be kept dry and the pipe shall not be laid in water.

The pipe shall not be placed on a bed containing frozen material.

The Contractor shall be responsible for keeping the pipe sewer and connections clean and free of all foreign material.

406.07.04.02 Steel Pipe

The Contractor shall place the steel pipe according to recommendations of the manufacturer. The Contractor shall prevent any structural damage or distortion to the steel pipe sewer when it is installed to the specified alignment and grade.

For structural plate pipe, the Contractor shall ensure that all assembly bolts are re-tightened with a minimum torque of 200 N·m for gauge size less than 3.5 mm and 340 N·m for gauge size greater than 3.5 mm.

406.07.04.03 Plastic Pipe

The Contractor shall follow the recommendations given by the manufacturer for the pipe joints or welds.

The Contractor shall ensure that the gasket is not damaged, displaced or contaminated with foreign matter. The Contractor shall be responsible for replacing any displaced or out of position gasket and placing in its proper position before closure of the joints is attempted. Polyethylene pipe couplers shall be connected such that the corrugations or projections of the coupler properly engage the pipe corrugations. Polyvinyl chloride plastic pipe shall be jointed using a bell and spigot joint with elastomeric gaskets.

406.07.04.04 Jointing

The Contractor shall ensure the cleanliness of joint surfaces. The Contractor shall ensure that Manufacturer's instructions for pipe jointing are followed.

406.07.04.05 Service Connection

Service connections to the main sewer shall be made using factory made tees or wyes, strap-on-saddles or other approved saddles. Factory made tees or wyes shall be used for all service connections where the diameter of the main sewer is less than 450mm or less than twice the diameter of the service connection.

Where existing sewers and service connections are to be connected to sewers and service connections, proper jointing procedures shall be used.

Where a pipeline is to be connected into existing maintenance holes, catch basins or ditch inlets, neat openings of the size necessary to accommodate the pipeline shall be made in the walls of the maintenance holes, catch basins or ditch inlets, and the pipeline shall be securely and neatly grouted in place with non-shrink grout. The end of the pipeline shall be flush with the inside of the structure wall.

406.07.04.06 Backfill

The Contractor shall be responsible for placing the backfill without any damage to, or movement of the pipe sewer. The Contractor shall maintain the intended shape of the pipe sewer during backfilling. The variation in diameter, span and rise of flexible pipe sewer shall not exceed 5% of the original dimension.

Backfill shall be placed and compacted as specified in OPSS 501. Backfill on each side of the sewer pipe shall be completed simultaneously. At no time shall the levels on each side differ by more than 200 mm loose.

406.07.04.07 Cover Material

The Contractor shall be responsible for placing the cover material without any damage to or movement of the pipe sewer. Cover shall be placed and compacted according to OPSS 501. Cover material on each side of the sewer pipe shall be completed simultaneously. At no time shall the levels on each side differ by more than 200 mm loose.

406.07.04.08 Protection From Traffic

Prior to allowing construction equipment or vehicular traffic over the completed pipe sewer, the Contractor shall ensure that the depth of backfill or cover material shall be at least equal to the minimum required for protection as specified in the Contract.

406.09 MEASUREMENT FOR PAYMENT

Section 406.09 of MTC Form 406, August 1982, is deleted and replaced with the following:

406.09.01 Pipe Sewer

Measurement of pipe sewer is by Plan Quantity, as may be revised by Adjusted Plan Quantity, of the horizontal length in metres from centre to centre of end catch basins or centre to end of outlets, maintenance holes or inlets, with no deduction for intermediate catch basins, manholes or inlets.

Where the grade of pipe sewers is 10% or greater, then the slope length is used in the above measurement.

406.10 BASIS OF PAYMENT

Section 406.10 of MTC Form 406 is deleted and replaced with the following:

Payment at the contract price for the appropriate pipe sewer tender item(s) shall be full compensation for all labour, equipment and materials required for all:

- earth excavation,
- removal of pavement, curb and gutter, and sidewalk (except where there is a separate item for removal of pavement, curb and gutter or sidewalk),
- shoring and bracing,
- dewatering,
- supply and installation of the pipe sewer,
- connection of intercepted drains and service connections
- supply, placement and compaction of the bedding, cover and backfill material
- management of excavated material

and all other work necessary to complete the sewer installation.